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VOLUME XXI.

THE AQUATIC COLEOPTERA OF THE SOUTH-EAST OF IRELAND.

BY FRANK BALFOUR BROWNE, M.A., F.R.S.E., F.Z.S.

Out of some 220 species of water-beetles (Hydradephia and Hydrophilidae, not including the genera Sphaeridium, Cercyon, Megasternum and Cryptopleurum) recorded from Great Britain, about 160 have, up to the present, been found in Ireland. Messrs. Johnson and Halbert mention 138 species in their list published in 1901,¹ but from that list three species recorded for the district covered by this paper should almost certainly be removed, viz.:—*Platambus maculatus*, L., *Ilybius guttiger*, Gyll., and *Limnebius papposus*, Muls.

The first of these species was admitted to the list on insufficient grounds, and, as it has not been taken since, I think the name should be deleted. I have elsewhere expressed the opinion that it is a species which has comparatively recently spread to the west of Great Britain, its absence from the Isle of Man and the western Isles of Scotland, excepting Skye, supporting this view. From what follows in this paper, if the species occurs in Ireland, I should expect it to be found in the eastern or southern counties, but at present there is no evidence that it exists there.

With regard to *Ilybius guttiger* the species was first recorded by Hogan² who stated that he took a specimen

¹ A list of the Beetles of Ireland. *Proc. Roy. Irish Acad.*, ser. iii., vol. vi.

² Catalogue of Coleoptera found in the Neighbourhood of Dublin. *Zoologist*, xi., 1853, pp. 4134-4136.

at Kingstown. On this authority it was included in M'Nab's list¹ and again in the 1901 list where, however, an additional record is given—"River Dodder at Oldtown," for a specimen taken by H. K. Gore Cuthbert and apparently named by G. A. Lewcock. I have unfortunately failed to discover any trace of either Hogan's specimen or that found by Cuthbert. The latter specimen apparently passed into Lewcock's hand and his collections, I learn from Mr. Newbery, were sold some years ago, the water-beetles apparently having been purchased by a collector on the Continent.

The only other Irish record for the species is one by Donisthorpe, who, in 1905 reported it from Wicklow². At my request he courteously sent me all his specimens, and they turn out to be a rather dark form of *I. aenescens*, Thoms. Fowler, in "British Coleoptera," 1887, separates these two species by several characters but rather emphasizes the difference in colour. He says of the former "upper surface deep black without trace of bronze reflection," while the latter is described as having "a distinct aeneous reflection." Now this colour separation is not reliable. So far as I know, *guttiger* is always black but *aenescens* varies greatly in the quality of the aeneous reflection. Those from Kippure, where Donisthorpe collected, are mostly very black, although brassy-coloured ones occur; and when I collected on the same grounds last March, I thought at the time that I was taking both species. There are, however, certain characters upon which these two species can easily be separated. One, applicable to both sexes, is the appearance of the groove in the mesosternum which receives the prosternal process. In *aenescens* this is shallow and appears rather short, while in *guttiger* it is deeper and appears longer. There are also other characters for separating the males of these species besides those given by Fowler and other authors. The claws of the anterior tarsi viewed from below are quite distinct in the two species.

¹ British Association Guide, Dublin, 1878.

² Coleoptera in 1905. *Ent. Rec.*, xvii., 1905, p. 291.

Also in *aenescens* the metasternum is distinctly keeled in the median line, while in *guttiger* there is a mere rudiment of a keel and in some specimens none at all. The coxal processes in both species have a distinct keel down their median line.

The Irish records for *Limnebius papposus* are for Donegal East, Armagh, Down and Dublin. The records for the first three counties are by Johnson, while the Dublin record is by M'Nab, who mentions the species as having been taken in the Dodder River¹. Mr. Johnson kindly allowed me to see all his water-beetles, and I have also seen the Dublin Museum collection and all Irish specimens standing as *L. papposus* are in reality *L. truncatellus*. There is a great deal of confusion with regard to these two species, especially in the case of the females which, on the characters usually given are very difficult to separate. There is, however, one character by which these may be easily distinguished and that is the form of the mesosternal process. In *L. truncatellus* this structure is broad, does not taper and is nearly flat, while in *L. papposus* it is narrow, tends to taper and is slightly grooved.

Several changes have been made as to synonymy since 1901, which have tended to make a number of records useless. Edwards² has shown that the *Haliplus ruficollis* of British authors includes several species and some of these are recorded in this paper. *Laccobius sinuatus*, Mots., which was formerly regarded as synonymous with *L. nigriceps*, Thoms., is now recognised as distinct, but Dr. Sharp has recently come to the conclusion that Motschulsky's name should be dropped as his description is too vague to apply to any one species and has suggested that our so-called *sinuatus* should in future be known as *ytenensis*³.

The fact that *Helophorus porculus*, Bedel, has only recently been recognised in Britain as distinct from *H. rugosus*⁴

¹ British Association Guide, Dublin, 1878.

² A Revision of the British Species of *Haliplus*, Latreille. *Ent. Mo. Mag.*, ser. 2, xxii., Jan. 1911.

³ A new Species of *Laccobius*. *Ent. Mo. Mag.* (2), xxi., p. 250, 1910.

⁴ E. A. Newbery, *Ent. Mo. Mag.*, ser. 2, xix., p. 88, 1908.

does not affect this paper since neither species has so far occurred in the south or east of Ireland.

Octhebius viridis, Peyron,¹ was not recognised in Britain as distinct from *O. margipallens*, Latr., until 1907, and apparently most, though not all, of the specimens recorded under the latter name belong to this species. I recorded *margipallens* for East Cork,² but, not having kept the specimens, I am unable to say whether they were correctly named. Since, however, *viridis* has occurred in Ireland in Armagh and Wicklow, and there is no other record for *margipallens*, I think that the Cork specimens probably were the former species.

Apparently *Hydraena angustata*, Sturm, is not a British species and all records of it apply to *H. longior*, Rey. I have therefore so dealt with a record of *angustata* for Waterford. Making allowance for these changes in synonymy, about 124 species have occurred in the area covered by the six counties, Dublin, Wicklow, Wexford, Carlow, Kilkenny and Waterford, which I have included within the scope of this paper.

I have myself collected in all these counties but to a very varying extent. My Dublin experience occupied two afternoons, one of which was spent in learning how to find *Octhebius Lejolisii*, and the other in working some salt marsh near Portmarnock, where I found a single specimen of *Agabus conspersus*. The other five counties I visited at the end of March and the beginning of April of the past year and the extremely cold weather interfered greatly with my results. One projected excursion to some mountain loughs at the head of Glenmalur had to be abandoned as the high ground was covered with snow, so that my mountain records in Wicklow are all for the only piece of high ground which seems to have been worked in that county, that along the road above Lough Bray, on Kippure Mountain, which I was fortunate enough to visit on a warm day before the snow came.

¹ E. A. Newbery, *E.M.M.*, Ser. 2., xviii., pp. 172-3, 1907.

² *Irish Nat.*, xvi., Sept. 1907.

In Wicklow the best locality I visited was the Murrough, a marshy region lying inside the railway and extending from a little south of Greystones nearly to Wicklow town. Behind some of the coastal sand-dunes are excellent marshes, especially just south of Arklow. In this latter locality *Hydroporus granularis* was quite common, but otherwise it appears to be a rarity in Ireland, although I have taken a few specimens in Antrim, Down, East Donegal, Sligo, Roscommon and Westmeath and have seen a specimen from South-east Galway. In the same place *Agabus femoralis* was common, another species which is somewhat rare in Ireland.

Near Rathdrum I visited what appeared to be an incipient peat-moss, where I found a few of the oxyophile species such as *Agabus affinis*, *Philhydrus minutus*, etc., and otherwise a few marl-pits in fields near Wicklow town gave me some interesting results.

Wexford is perhaps the most attractive county—from the point of view of a pond-life student—I have yet seen in Ireland. Ponds of all sizes from small grassy duck-ponds to small lakes occur with great frequency and both north and south of the county town are extensive marshes with here and there excellent drains, both brackish and fresh water. It was in the smaller ponds and ditches where *Glyceria* formed the dominant vegetation, that *Rhantus Grapii* chiefly occurred. This species, which has not previously been recorded from Ireland, was comparatively common but very local although occurring in two or three separate parts of the county. One specimen was taken in a sphagnum swamp with such oxyophiles as *Agabus affinis*, etc., but otherwise the species was entirely helophile, as I always found it to be in East Norfolk. My Irish specimens are rather smaller than my English ones, but otherwise they appear to be quite similar to them. *Cymbiodyta ovalis* occurred very sparingly in the county, while *Enochrus bicolor* was only found in one ballast pit by the G. S. & W. Railway near Wexford, where, however, it was common.

In both Wicklow and Wexford the halophile species were common in the marshes near the sea. I happened to visit the

Wicklow salt-marshes at the time of the spring tides and *Octhebius auriculatus* was exceedingly abundant in the shallow salt pools with *O. marinus*, *bicolor*, *punctatus* and *viridis*. *Helophorus Mulsanti*, a species previously only recorded from Dublin and Down was also common in both these counties, as was *Agabus conspersus*.

In Waterford I only had a few hours collecting and I worked the marsh immediately south of the county town ; it proved to be very barren as I only succeeded in taking about 30 species. With previous records the total list for this county is now only about 52 species so that there is still plenty of work to be done there.

In Kilkenny also I only spent one day but with better results. Working a marsh near Glenmore by the River Barrow, I came across the usual species of the halophile groups such as *Agabus conspersus*, *Philhydrus maritimus* and *Octhebius marinus*. This seems a long way inland for these brackish-water species but the river is tidal for some miles above this point and doubtless the marsh occasionally receives a supply of salt water with the high tides. *Enochrus bicolor* occurred sparingly in a pond in the same neighbourhood.

In Carlow only two species taken are worth referring to. *Laccophilus interruptus*, which was not uncommon in the Barrow near Tinnahinch, belongs to a group of species which prefer slowly moving clear water, and no doubt its distribution has been facilitated by the opening up of canals. *Haliplus nomax*, a species recently added to the list, also occurred in the river at the same place. It is a species which is chiefly found in loughs and canals ; in fact in two cases which have come under my observation it was exceedingly common when almost no other *Haliplus* was to be found.

I should expect *Bidessus minutissimus* to occur in the Nore and the Barrow, but I was unable to find a suitable spot in which to search for it near Tinnahinch, even had I done so I doubt if the species would have been about so early in the season.

Helophorus affinis var. *griseus*, occurred in all five counties, and is fairly common wherever I have collected in Ireland. It had not been recognised previous to 1907,

when I found a single specimen at Youghal, East Cork, and it did not occur commonly in my experience until some time after that. Whether this was due to the fact that it is chiefly a spring insect inhabiting what Edwards very aptly terms "vernal swamps," or whether it is due to a sudden increase and expanded distribution, I will not venture to say. It is possible that increased opportunities of spring collecting may account for the case and the same remarks will apply to *Helophorus granularis* which I now find fairly often and usually abundant, but which I did not know prior to 1908¹.

The following list includes all the records for the six south-eastern counties which I have been able to find. A large cross indicates that I have taken the species myself, and a small cross indicates that the species has been recorded. At the end of the paper I have added a bibliography of all papers known to me which refer to water-beetles of this south-eastern district.

SPECIES	DU	WI	WX	WA	KK	CW
<i>Brychius elevatus</i> , Panz. . .	x	x	—	x	x	—
<i>Haliplus obliquus</i> , F. . .	x	x	—	x	—	—
<i>confinis</i> , Steph. . .	x	—	x	—	x	—
<i>flavicollis</i> , Sturm. . .	x	—	x	—	—	x
<i>fulvus</i> , F. . .	x	—	x	—	—	x
<i>ruficollis</i> , De G. . .	?	x	x	x	x	x
<i>Wehnckeii</i> , Gerh. . .	—	x	x	*	x	—
<i>nomax</i> , Browne. . .	—	—	—	—	—	x
<i>immaculatus</i> , Gerh. . .	—	—	x	—	—	—
<i>fluviatilis</i> , Aubé . . .	—	—	—	—	—	x
<i>lineatocollis</i> , Marsh. . .	x	x	x	x	x	x
<i>Pelobius tardus</i> , Herbst. . .	—	x	—	—	—	—
<i>Noterus clavicornis</i> , De G. . .	x	—	—	x	—	—
<i>sparsus</i> , Marsh. . .	x	x	x	x	x	—

* Almost all the *Haliplus* which were not *lineatocollis* were typical *ruficollis* ♂ ♀. No male *Wehnckeii* were found but two or three female specimens, with the elytral interstrial spaces impunctate at the base, were taken. I have doubts as to the entire reliability of this character for distinguishing females of *Wehnckeii* from those of *ruficollis*, but I shall go into this question on another occasion.

SPECIES	DU	WI	WX	WA	KK	CW
<i>Laccophilus interruptus</i> , Panz. <i>obscurus</i> , Panz.	x x	— x	x —	x —	x x	x x
<i>Bidessus minutissimus</i> , Germ.	x	—	—	—	—	—
<i>Hyphydrus ovatus</i> , L. ..	x	—	x	—	—	—
<i>Caelambus versicolor</i> , Schall. <i>v.-lineatus</i> , Zett. ..	x x	x x	— x	x x	— x	x x
<i>inaequalis</i> , F. ..	x	x	x	x	—	—
<i>confluens</i> , F. ..	x	—	—	—	—	—
<i>impressopunctatus</i> , Schall ..	—	x	x	x x	x	—
<i>Deronectes assimilis</i> , Payk. <i>elegans</i> , Panz. (<i>depressus</i> , Brit. auct.) ..	x	—	—	x x	x x	x x
<i>xii.-pustulatus</i> , Ol. ..	x	x	x x	x x	—	—
<i>Hydroporus pictus</i> , F. ..	x	x	x x	—	—	x x
<i>granularis</i> , L. ..	—	x	—	—	—	—
<i>lepidus</i> , Ol. ..	x	x	x	x	—	x x
<i>rivalis</i> , Gyll. ..	x	—	—	x	—	—
<i>septentrionalis</i> , Gyll.	x	—	x	—	—	—
<i>Davisii</i> , Curt. ..	x	—	—	—	—	—
<i>lineatus</i> , F. ..	x	—	x x	x	—	x
<i>tristus</i> , Payk. ..	—	x	—	—	—	—
<i>umbrosus</i> , Gyll. ..	—	x	—	x	—	—
<i>angustatus</i> , Sturm. ..	—	x	x	x x	—	x x
<i>Gyllenhalii</i> , Schiöd. ..	—	x	x	x	x	—
<i>morio</i> , Dej. ..	—	x	—	—	—	—
<i>vittula</i> , Er. ..	x	x	x	x x	—	x x
<i>palustris</i> , L. ..	x	—	x	x x	—	x x
<i>incognitus</i> , Sharp. ..	—	x	—	x x	—	x x
<i>erythrocephalus</i> , L. ..	x	—	x	x x	—	x x
<i>longicornis</i> , Sharp ..	—	x	x	—	—	—
<i>memnonius</i> , Nic. ..	x	—	x	x	—	—
<i>obscurus</i> , Sturm. ..	—	x	x	x x	—	—
<i>nigrita</i> , F. ..	x	—	x	x	—	x x
<i>discretus</i> , Fairm. ..	x	—	—	x	—	x x
<i>pubescens</i> , Gyll. ..	x	—	x	x x	—	x x
<i>planus</i> , F. ..	x	—	x	x x	—	x x
<i>lituratus</i> , F. ..	x	—	x	x	—	x x
<i>Agabus guttatus</i> , Payk. ..	x	x	x	x	—	—
<i>paludosus</i> , F. ..	x	x	x	x	—	x
<i>affinis</i> , Payk. ..	—	x	x	x	—	—
<i>nebulosus</i> , Forst. ..	x	x	—	x	—	—
<i>conspersus</i> , Marsh. ..	x	x	x	x	—	x
<i>femoralis</i> , Payk. ..	—	x	x	—	—	—
<i>arcticus</i> , Payk. ..	—	x	x	—	—	x
<i>Sturmii</i> , Gyll. ..	x	x	x	x	—	x
<i>chalconotus</i> , Panz. ..	x	x	x	x	—	x
<i>bipustulatus</i> , L. ..	x	x	x	x	—	x
<i>Ilybius fuliginosus</i> , F. ..	x	x	x	x	—	x
<i>ater</i> , De G. ..	x	x	x	x	—	—
<i>obscurus</i> , Marsh. ..	x	x	x	x	—	—
<i>aenescens</i> , Thoms. ..	x	x	x	x	—	—

SPECIES	DU	WI	WX	WA	KK	CW
<i>Copelatus agilis</i> , F.	—	X	X	—	—	—
<i>Rhantus Grapii</i> , Gyll.	—	—	X	—	—	—
^{exoletus} , Forst.	—	X	x	x	—	—
^{notatus} , F.	—	X	—	—	—	—
^{bistriatus} , Berg.	—	X	x	x	—	—
<i>Colymbetes fuscus</i> , L.	—	X	X	—	X	—
<i>Dytiscus punctulatus</i> , F.	—	x	X	X	—	—
^{marginalis} , L.	—	X	X	—	—	—
<i>Acilius sulcatus</i> , L.	—	X	X	—	—	x
<i>Gyrinus minutus</i> , F.	—	X	—	x	—	—
^{elongatus} , Aubé	—	X	X	—	—	—
^{natator} , Scop.	—	X	X	x	X	—
^{marinus} , Gyll.	—	X	—	x	—	x
^{opacus} , Sahlb.	—	X	—	—	—	x
<i>Orectochilus villosus</i> , Müll.	X	—	—	—	x	—
<i>Hydrobius fuscipes</i> , L.	X	X	X	X	—	X
var. <i>picirus</i> , Thoms.	—	X	X	X	—	X
<i>Philhydrus testaceus</i> , F.	—	—	X	—	—	—
^{maritimus} , Thoms.	X	—	X	—	x	—
^{melanocephalus} , Ol.	X	X	X	X	X	—
^{nigricans} , Zett.	—	X	X	X	X	—
^{minutus} , F.	—	X	—	—	—	—
^{coarctatus} , Gredl.	—	X	X	X	—	—
<i>Cymbiodyta ovalis</i> , Thoms.	—	—	X	X	—	—
<i>Enochrus bicolor</i> , Gyll.	X	—	X	X	—	X
<i>Anacæna globulus</i> , Payk.	X	X	X	X	—	X
^{limbata} , F.	X	X	X	X	—	x
var. <i>ovata</i> , Reiche	—	X	X	X	—	X
<i>Helochares punctatus</i> , Sharp.	—	—	X	X	—	—
<i>Laccobius nigriceps</i> , Thoms.	X?	X	—	—	—	x?
^{yteneensis} , Sharp.	X?	—	x?	—	—	x?
^{alutaceus} , Thoms.	X	X	X	X	X	X
^{minutus} , L.	X	—	X	X	—	—
^{bipunctatus} , F.	X	—	X	X	—	X
<i>Limnebius truncatellus</i> ,	—	—	X	X	X	X
^{Thunb.}	—	—	X	X	X	X
^{nitidus} , Marsh.	X	—	—	X	—	X
<i>Chætarthria seminulum</i> ,	—	—	—	X	—	x
^{Herbst.}	X	—	—	X	—	X
<i>Helophorus nubilus</i> , F.	X	—	X	X	X	X
^{aquaticus} , L.	—	X	X	X	X	X
iv.- ^{signatus} , Bach. ¹	?	—	—	—	—	—
^{viridicollis} , Steph.	—	X	X	X	X	X
^{Mulsanti} , Rye	X	X	X	X	X	X
^{affinis} , var. <i>griseus</i> , Hbst.	X	X	X	X	X	X

¹ A record of *H. dorsalis* Steph., recorded doubtfully by Hogan, 1856, may perhaps refer to this species which has otherwise not occurred in Ireland.

SPECIES	DU	WI	WX	WA	KK	CW
<i>Helophorus granularis</i> , L. . .	x	x	—	—	—	—
<i>brevipalpis</i> , Bedel. . .	x	x	x	x	x	x
<i>Hydrochus elongatus</i> , Schall. . .	—	—	x	x	—	—
<i>angustatus</i> , Germ. . .	—	—	x	x	—	—
<i>Henicocerus exsculptus</i> , Germ. . .	x	—	—	—	—	—
<i>Octhebius viridis</i> , Peyron . . .	—	x	—	—	—	—
<i>marinus</i> , Payk. . .	x	x	x	x	x	—
<i>pygmaeus</i> , F. . .	x	x	x	x	x	—
<i>bicolon</i> , Germ . . .	x	x	x	—	—	—
<i>rufimarginatus</i> , Steph. . .	—	x	x	—	—	—
<i>auriculatus</i> , Rey. . .	x	x	—	—	—	—
<i>punctatus</i> , Steph. . .	x	x	x	—	—	—
<i>Lejolisii</i> , Rey & Muls. . .	x	x	—	—	—	—
<i>Hydraena riparia</i> , Kug. . .	x	x	x	x	x	x
<i>nigrita</i> , Germ. . .	—	—	—	x	—	—
<i>longior</i> , Rey . . .	—	—	—	x	—	—
<i>gracilis</i> , Germ . . .	—	x	—	—	x	—
<i>pulchella</i> , Germ. . .	—	x	—	—	x	—
<i>Britteni</i> , Joy. . .	—	—	—	x	—	—
<i>Cyclonotum orbiculare</i> , F. . .	x	x	x	x	x	—

Of the species included in the above list the majority are distributed fairly generally throughout Ireland, but a certain number have an Irish distribution which is decidedly southern and eastern. A few species not in the list may be added to this—what I may call—South-eastern group, since although they have not so far been recorded for any of the six counties, they have only occurred in the south and east of Ireland.

The following list includes the species of this South-eastern group:—

- | | |
|--------------------------------------|--------------------------------------|
| <i>Pelobius tardus</i> , Hbst. | <i>Helophorus Mulsanti</i> , Ryc. |
| <i>Bidessus minutissimus</i> , Germ. | <i>nanus</i> , Sturm. |
| <i>Hydroporus oblongus</i> , Steph. | <i>Hydrochus elongatus</i> , Schall. |
| <i>Agabus conspersus</i> , Marsh. | <i>angustatus</i> , Germ. |
| <i>Rhantus Grapii</i> , Gyll. | <i>Octhebius viridis</i> , Peyron. |
| <i>Philhydrus maritimus</i> , Thoms. | <i>marinus</i> , Payk. |
| <i>Cymbiodyta ovalis</i> , Thoms. | <i>rufimarginatus</i> , Stph. |
| <i>Enochrus bicolor</i> , Gyll. | <i>auriculatus</i> , Rey. |

The extreme range of this group is from Antrim round the east and south coasts to Clare, and the accompanying "symbol" map indicates the counties and vice-counties for which any of the species are recorded. A large proportion,

WD	ED	LD	AN	
	FE	TY	AR DO	
WM	SL	LE	MO	
	EM	RO	CV	LH
WG	NG	LF	WH	ME
	SG	KC	KD	DU
CL	NT	QC	CW	WI
NK LK	ST	KK	WX	
SK MC	EC	WA		
	WC			

Extreme range of the south-eastern group.

6 out of 16, of these species are maritime, viz., *A. conspersus*, *Ph. maritimus*, *H. Mulsanti*, *O. viridis*, *marinus* and *auriculatus*, yet so far as is at present known the extreme limit of Irish distribution of these halophiles is from Antrim to Clare, this extreme range only being recorded for *Ph. maritimus*, the others not extending north beyond Down, or west

beyond Mid Cork. Some of the species in the list have so far only occurred in a single county, e.g., *H. oblongus*, *Rh. Grapii* and *H. nanus* and most of the others are well within the extreme limits of the group.

The distribution of the species of this group in Britain is interesting, as with the exception of *B. minutissimus* which belongs to Watson's "Atlantic" type, all the others belong to the "English" type which includes those species concentrated in the south.

Just as these south-eastern Irish water-beetles have a southern English distribution, so have the south-eastern Irish plants,¹ and those land and fresh-water snails which in Ireland show an eastern and south-eastern distribution also tend to occur chiefly in the south of England.

The question naturally arises, is this south-eastern group a distinct element or type in the Irish fauna, or is it a chance

¹ Praeger, R.L., On types of Distribution in the Irish Flora.
Proc. R. I. Acad., xxiv., Sect. B., 1902.

assemblage of species associated together owing to some common tie such as physical environment? If the group were a distinct element its Irish distribution would lead us to expect that it belonged to Forbes' "Gallican" type,¹ but its English distribution does not bear this out. With the exception of *B. minutissimus*, none of the species of these south-eastern Irish water-beetles are concentrated in the west or south-west of England, and some of them are even rare on that side of the country. For instance, *H. oblongus* has been once recorded for South Devon² and not from anywhere else in the west or south-west. Similarly *Rh. Grapii* has once been found in south Lancashire many years ago,³ otherwise nowhere in the west or south-west. *H. nanus* was recorded doubtfully for Exeter (S. Devon) by Parfitt in 1867, but otherwise there is no record for it west of East Gloucester.

But the group is not an isolated one; there are species which, though not confined to or specially concentrated in the south-east are, nevertheless, absent from or rarer in the west, and which are therefore intermediate in their distribution between the south-eastern group and the group which is generally distributed throughout Ireland. Thus the south-eastern group seems to be merely a part of what we might call—following Watson's nomenclature for Britain—the "Irish" type.

Examples could be chosen showing all stages of distribution across Ireland, but a few will serve to show intermediate range. *A. femoralis*, a northern species, absent from the north of Ireland, has been recorded from Limerick and Roscommon outside our district. *H. nubilus* ranges as far as East Donegal in the north. *Rh. notatus* and *exoletus*, *H. longior*, *pulchella*, *atricapilla* and *Britteni* have a more extended range, reaching far across the central plain in some cases to Roscommon. Symbol maps of two of these

¹ The Geological Relations of the Fauna and Flora of the British Isles, &c. Mem. Geol. Survey, I., 1846.

² Victoria County History, 1906.

³ Vide Ellis, J. W.: The Coleopterous fauna of the Liverpool district, *Proc. Liverpool Biol. Soc.*, vols. ii., & iii., 1889.

species will help to show this intermediate type of distribution.

WD	ED	LD	AN	WD	ED	LD	AN
FE	TY	AR	DO	FE	TY	AR	DO
WM	SL	LE	MO	WM	SL	LE	MO
EM	RO	CV	LH	EM	RO	CV	LH
WG	NG	LF	WH ME	WG	NG	LF	WH ME
SG	KC	KD	DU	SG	KC	KD	DU
CL	NT	QC	CW WI	CL	NT	QC	CW WI
NK	LK	ST	KK WX	NK	LK	ST	KK WX
SK	MC	EC	WA	SK	MC	EC	WA
WC				WC			

Helophorus nubilus, F.

Rhantus exoletus, Forst.

We are therefore faced with the question why, if these south-eastern species are part of the "Irish" type, are they localised in the south-east corner of Ireland? On the question as to whether the localisation is due to some environmental factor the general distribution of the species is important, and we have in this group an extraordinarily heterogeneous collection. For instance, *H. oblongus* has a distribution from France in the south through northern Europe (Sweden), Siberia and North America. *A. femoralis* is found in the Balkan Peninsula, Italy, Germany, France, Belgium, Russia, Finland, Sweden, and Siberia, and *Rh. Grapii* has much the same range. *H. nanus* occurs in northern Siberia and various countries southward to the Mediterranean district, while *A. conspersus* only reaches Denmark in the north, being found chiefly in the Mediterranean district (e.g., Sardinia, Corsica, Italy, Sicily, and North Africa) extending eastwards as far as India.

This heterogeneity alone is sufficient to throw doubt on a suggestion of the localisation being due to a climatic factor and a comparison of eastern Irish climatic conditions with those in Britain and the Continent makes it even more improbable that climate has been the localising agent.

That two species such as *H. oblongus* with a holarctic range and *A. conspersus* with a warm-temperate range should be both localised in the east of Ireland suggests that possibly both have reached this country comparatively recently. If such a species as the former existed in the British Islands during the Glacial period on the very fringe of the ice-sheet, why has it been, as it were, left so far behind when the ice retreated? On the Continent and in America it has succeeded in reaching much higher latitudes. On the other hand it seems most improbable that a warm-temperate species such as *A. conspersus* could have survived at all in close proximity to the ice, when the flora of Devon consisted of the arctic Dwarf Birch and arctic mosses even at sea-level, and when the English Channel was a cold ice-ridden sea.¹

This suggests therefore that the group has reached Ireland since the Glacial period, and incidentally this carries with it the suggestion that the bulk of the "Irish" type is also post-Glacial. The larger question I will leave to a future occasion, but on the post-Glacial arrival of the south-eastern species something more may be said.

The gradual retreat of the ice-sheet, and the northward extension of the temperate climate probably produced a general northward movement of the fauna and flora. With regard to the Britannic area the movement may well have been from the east and the south-east, and the first post-Glacial arrivals must have been species capable of standing cold temperate conditions. The species moving westward would have tended to dominate those moving from the south-east, as they would have been better suited to the climate, but as the ice-sheet retreated and these cold-temperate species moved northward on the newly exposed ground, more southern species would reach our latitudes and it would be later still before any warm-temperate species could extend their range limit to our islands.

Now, *A. conspersus* and *P. tardus* are two of the warm-temperate water-beetles of the British Islands. There are

¹ Clement Reid: The relation of the present Plant Population of the British Isles to the Glacial Period. Section K., British Association, Portsmouth, 1911, and *Irish Naturalist*. vol. xx., p. 201.

others, as for instance :—*Haliplus cinereus*, Aubé; *Cnemidotus impressus*, F.; *Laccophilus variegatus*, Germ.; *Hydrovatus clypealis*, Sharp; *Agabus brunnneus*, F., etc. Only the first two species occur in Ireland, the rest being found in the Britannic area only in the extreme south and south-east of England.

In other groups of the fauna and in the flora there are species whose present "metropolis" is in the south and south-west of Europe which within the Britannic area occur only in the extreme south and south-east. The Dartford Warbler among birds, a native of Spain, Provence, Italy, &c., is found only in the eastern counties of England. *Suaeda fruticosa*, Forsk, *Frankenia laevis*, L., *Salicornia radicans*, L., &c., are examples of "Lusitanian" plants confined to or centered in the southern and south-eastern counties; other examples occur among the land-beetles, butterflies, land and fresh-water shells, and no doubt in other groups.

Now these southern English species seem to be merely another and later group of the general fauna and flora of the British Islands, species which, having got a precarious footing are struggling to extend their range under less suitable climatic conditions than they enjoy in southern Europe, but under conditions which, we may assume, will become more suitable in the course of ages—so long as the polar ice-cap continues to shrink!

I make no attempt to discuss the question of the means by which these species have reached our area, whether by crossing a land-bridge or through chance dispersal by winds and ocean currents. There seems every reason to believe that their in-coming has been since the climax of the Glacial period, and that we can still, to some extent, recognise earlier and later arrivals.

If land-bridges are essential for the expansion to our area of the continental fauna and flora, then, no doubt, the British Isles will develop, in the course of time, a peculiar type markedly different from that found on the mainland of Europe; if, on the other hand, chance dispersal by winds and ocean currents is an important factor in the peopling of islands, then only a few of the animal groups are completely

cut off from their continental relations, and we may still hope to see new animals and plants arriving from time to time on our shores, continuing an immigration which has, perhaps, been going on slowly but surely for more than ten thousand years.

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REVIEWS.

PHOTOGRAPHIC BIRD-BOOKS.

The Home-Life of the Spoonbill, the Stork and some Herons : Photographed and described by BENTLEY BEETHAM, F.G.S. With 32 Plates. London : Witherby & Co. Price 5s. net.

The Life of the Common Gull told in Photographs : by C. RUBOW. Translated from the Danish, with illustrations. London : Witherby & Co. Price 1s 6d. net.

The Young Ornithologist : a guide to the Haunts, Homes, and Habits of British Birds, by W. PERCIVAL WESTELL, F.L.S., M.B.O.U. With a frontispiece in colours, and 65 photographic illustrations. London : Methuen & Co. Price 5s.

The number of illustrated bird-books to which the still-growing popularity of the camera has given rise is an alarming feature in every year's list of natural history publications. Mr. Bentley Beetham's "Home Life of the Spoonbill, the Stork, and some Herons" is, however well above the average of its class. The 32 plates form the sole *raison d'être* of the volume ; but they exhibit scenes from the life-history of the four species dealt with—the Spoonbill, White Stork, Common Heron, and Purple Heron, which an ordinary field-student would in most cases have no chance of observing for himself. The only bird of the four that breeds in Ireland is the Common Heron, and the few pages devoted by Mr. Beetham to its nesting habits are not devoid of interest.

A less ambitious little book is the translation from the Danish of Carl Rubow's "Life of the Common Gull told in photographs." In this case a majority of the photographs, admirably executed though they are, represent the bird in attitudes that may be matter of every-day observation in any district where *Larus canus* is more or less resident. The pages are pleasant to turn over, some of them vividly recalling picturesque scenes of rural life ; but one cannot help reflecting that booklets of this kind might be multiplied *ad infinitum* with little benefit to science, while the disadvantages attendant on such multiplication are obvious.

Of Mr. Westell's book it is superfluous to say that the photographs with which it is profusely illustrated are—with a few exceptions—excellent, and that without them the barrenness of the book, even as a help to the youngest ornithologist, would be transparent to any one. Mr. Westell aims at being popular, but apparently thinks that to attain this end it will suffice to be unsystematic. He claims as a special feature of his work the arrangement of our common birds in sections corresponding with their environment—*e.g.*, "Birds of the Garden," "Birds of the Country Lane," "Birds of the Woodland," &c., &c. There are a score of other ways in which birds might be quite as suggestively arranged, and if each of these were to be made the foundation for a new beginner's handbook where should we end ? As a matter of fact, many of the birds dealt with by Mr. Westell might have fitted with equal appropriateness into other chapters than

those in which he has placed them. It would be quite as fitting, for instance, to style the Great Titmouse a bird of the country lane, and the Long-tailed Titmouse a bird of the woodland, as to follow the reverse arrangement, which Mr. Westell adopts. For young Irish ornithologists the present handbook would in any case be practically valueless, as no attempt is made in it to indicate which of the birds touched on are found in this country.

C. B. M.

NEWS OF SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

The Annual Report and Proceedings of the Club for the session 1910-11 are to hand ; they include as usual reports of the summer excursions, and abstracts of the papers read at the winter meetings. The Report is made specially interesting by the memorials it contains relating to the late Samuel Alexander Stewart. A full account is given of the proceedings at the memorial meeting held on January 17, at which the principal speakers were Rev. C. H. Waddell, R. Lloyd Praeger, and R. J. Welch ; Messrs. George Donaldson, W. Gray, M.R.I.A., W. Swanston, F.G.S., John Brown, F.R.S., and John Hamilton also taking part. A poem *in memoriam* is also included, and the account is illustrated by a portrait of Stewart reproduced from this journal, and a photograph of the monument—the work of Miss Praeger—erected on his grave by the Belfast Club. An important feature of this number of the Proceedings is two papers on Glacial and post-Glacial Foraminifera by Mr. Joseph Wright, which are noticed elsewhere.

THE SECOND INTERNATIONAL CONGRESS OF ENTOMOLOGY.

The Second International Congress of Entomology will be held at Oxford from August 5th to 10th, 1912. Further particulars will be announced shortly. The President of the Congress is Professor E. B. Poulton, F.R.S., D.Sc.

The Executive Committee propose to find for Members of the Congress lodgings in the town, or rooms in one or more of the Colleges at a moderate charge ; rooms in the Colleges will be available only for men.

The Executive Committee invite an early provisional notice of intention to join the Congress in order to be able to make the arrangements for the necessary accommodation.

The proceedings of the First Congress are in the press and will be published shortly.

All communications and enquiries should be addressed to the General Secretary of the Executive Committee, MALCOLM BURR, Care of The Entomological Society of London, 11, Chandos Street, Cavendish Square, London, W.C.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Nonpareil Bunting from Mr. E. H. Tronsdale, a Short-eared Owl from Mr. H. B. Rathborne, and a Fork-tailed Petrel from Mr. W. A. K. Young. The last-named bird, captured in Co. Cavan after the heavy gales of mid-November, only survived its arrival in the Gardens for a few days.

Two Puna cubs have been born in the Gardens. A Lesser White-nosed Monkey has been received on deposit. A Mona Monkey, an African Grey Parrot, a pair of Bare-eyed Cockatoos, and two pairs of Guinea fowl have been purchased.

The next important work projected by the Council is the establishment of a hatchery and ponds for the rearing of Salmon and Trout. In the carrying out of this work the Society has secured the co-operation of the Irish Fisheries Office and the Conservators and riparian owners of the Liffey. It is proposed to erect the hatchery near the Seal-pond, and the work will probably be commenced very soon.

DUBLIN MICROSCOPICAL CLUB.

NOVEMBER 5.—The Club met at Leinster House. A. R. NICHOLS (President) exhibited *Nebela bipes* and other Rhizopoda obtained during the Clare Island Survey, 1909–11, and recently recorded by Messrs. G. H. Waile and E. Penard in the *Proceedings of the Royal Irish Academy*, vol. xxxi.

N. COLGAN exhibited slides illustrating the radulae and jaws of the marine mollusca. Amongst the species dealt with were *Lamellaria perspicua*, *Akera bullata*, *Pleurobranchus plumula* and *Fissurella graeca*.

Professor G. H. CARPENTER showed the hypopharynx of a beetle-larva (*Dascillus cervinus*) on which the maxillulae, characteristic of the more primitive orders of insects, are clearly to be seen. The exhibit was illustrated with drawings made by Miss M. C. MacDowell, A.R.C.Sc. An account will shortly appear in the *Quart. Journ. Micr. Sci.*

W. F. GUNN showed Plum leaves affected with a disease caused by the parasitic fungus *Puccinia pruni*, Persoon. The fungus first makes itself visibly apparent in the form of minute brown spots on the under sides of the leaves. These are the clusters of uredospores or summer form of fruits. Later in the season these spots assume a darker colour, due to the presence of teleutospores, which are uniseptate or bicellular, and attached by a short hyaline pedicel. The surface of the teleutospores are minutely warted, the upper cell being appreciably larger than the lower one. Numerous club-shaped paraphyses accompany them. The fungus is known to attack also the leaves of the Cherry, Peach, Apricot, Almond, and Blackthorn. It has been thoroughly studied and the life history worked out by McAlpine (*Ann. Mycol.*, ii., 1904, p. 1.)

BELFAST NATURALISTS' FIELD CLUB.

OCTOBER 27.—CONVERSAZIONE.—The Club inaugurated its forty-ninth winter session by a conversazione, which was held in the hall of the Assembly Buildings. After tea the company spent an interesting evening examining the scientific exhibits, which were very varied in character. In the zoological section the special exhibit lent by the Belfast Municipal Museum attracted much attention. It included nine cases of rare birds, including Bonaparte's Gull, Sabine's Gull, and Bonaparte's Sandpiper, also a series of cases of injurious insects mounted to show their life-histories. G. Donaldson showed a case of Indian butterflies, and N. H. Foster had an exhibit of birds' eggs, showing variation among those of the same species. J. Hamilton exhibited living specimens of the larva of the Fox Moth. W. F. M'Kinney brought some insects, showing protective coloration from Brazil, and also Australian and Spanish shells. A. W. Stelfox exhibited living specimens of the larger British land shells. R. J. Welch's exhibit of the land and fresh-water mollusca from the south-east of England was a series showing mainly species which do not occur in Ireland, except a very few in the south-east, and included two new British species, *Planorbis vorticulus* and *Valvata macrostoma*. J. A. S. Stendall showed, by the aid of the microscope, the circulation of the blood in the foot of the Common Frog, and H. L. Orr brought a Thrush's nest with unusual lining, and a wasps' nest in a flower-pot. R. H. Whitehouse exhibited the parasite of sleeping sickness, and small jelly-fish from the plankton of the English Channel. Professor Gregg Wilson illustrated variation in Guille-mots' eggs.

In the botanical section, one of the features was a very fine series of water-colour drawings of British plants, by Dr. H. Drinkwater (Wrexham). In interesting contrast to this last-mentioned exhibit was water-colour drawings of British plants and series of shells, by A. G. Stubbs (Herts.) who used transparent colours instead of the opaque medium employed by Dr. Drinkwater. N. Carrothers's exhibit included *Lathyrus palustris*, *Rosa hibernica*, *Spiranthes Romanzoffiana* from Co. Down, *Pyrola secunda* from Co. Antrim, and *Pyrola rotundifolia* from Lancashire.

Specimens of Irish lichens were shown by M. J. Glover. Rev. Canon Lett showed under cultivation the rare hepaticas *Dumontiera irrigua* and *Pellia calycina*. W. H. Phillips had some very fine nature-prints of British ferns, and the Rev. C. H. Waddell had an exhibit of botanical specimens.

In the geological section R. Bell exhibited Cephalopoda from the Lower Lias, Co. Antrim. C. Bulla's exhibit of Carboniferous fish-remains included representative of the following genera:—*Cladodus*, *Labadus*, *Deltoptychius*, *Ordous*, and *Colonodus*. G. Donaldson showed his prize collection of local Cretaceous fossils, and also shells from the Boulder-clays of Antrim and Down. Dr. A. R. Dwerryhouse exhibited a magnificent collection of fossil Echinodermata. W. Gray illustrated Limestone in its geological and economic aspects. J. Strachan had specimens of eurite from Ailsa Craig, some very rare zeolites from foreign sources, and polished agate.

J. Wright exhibited with the microscope, Foraminifera from the Estuarine Clays of Limavady Junction and Magheramore.

In the miscellaneous section F. J. Bigger had an exhibit of St. Brigid's crosses, still made on St. Brigid's eve in every province of Ireland of rushes, straw, or peeled seileach, and nailed up above doors and fireplaces or beds. A. M'I. Cleland showed the various properties of the Bunsen flame. F. C. Forth exhibited a series of geographical illustrations, showing (1) land forms and (2) climate and vegetation; also a set of relief maps of various countries. The exhibit of recent find of stone and bronze objects from prehistoric hearths at Dundrum, Co. Down, shown by Mrs. W. A. Green and A. Shemeld, included a piece of pottery painted in brilliant colours, probably Etruscan, a bronze axe and pins, stone axes, &c. Another exhibit of antiquarian interest was that of W. J. Knowles, who displayed prehistoric implements of stone, &c., showing comparison between Irish and foreign examples. R. May showed a portrait of Patrick Doran, a former well-known mineral and fossil collector.

J. Orr's exhibit of electric furnace products included carborundum, electric alundum, and graphite. S. Wear brought a series of interesting microscopic slides. Amongst the photographic exhibits were some photographs by S. H. Douey, J. S. L. Jackson, W. A. Green and J. Welch. Miss Praeger's beautifully sculptured portrait of the late S. A. Stewart, so long and closely connected with the Club, was exhibited. W. S. Mullan showed water-colour sketches by Rev. A. L. Sydney Smith of the Rosapenna and Cavan districts.

At nine o'clock a short business meeting was held—the President (R. J. Welch), in the chair. Mr. Welch gave a brief resumé of the Club's work during the summer session, and drew special attention to the lately-formed junior section of the Club. Six new members were elected, four of whom were junior members.

A lantern display followed of views mainly taken at the summer excursions by the Club members. D. J. Hogg's slides, showing sunset and cloud effects, were much appreciated. Other slides were shown by Messrs. Wear, Stelfox, Douey, Gray, and Welch.

NOVEMBER 21.—The President (R. J. WELCH) read an address on Sand-hills, their formation, fauna, and flora, before a large audience. The President, in the course of his address, which dealt largely with Irish examples, said coast dunes are one of the small compensations for the waste of the land by the sea in other places, and they are formed by one of the main causes of the latter—the wind. When formed they become the best protection against marine erosion, as they form a very elastic buffer against the waves. Dunes form rapidly where the sea accumulates sand above low water-mark, so that it becomes dry between the tides. This may be seen any windy day on the strand if the tide is low, especially if the wind is blowing landwards. It may be asked from whence the enormous amount of material in our big sand-hills is derived. The material, at least on the east coast, is almost entirely fine quartz grains. It is formed by marine erosion, the disintegrating action of frost, sun, and wind and rivers are

constantly bringing down débris from the hills, and from the erosion of their own beds. The sand-hills so common at the mouths of many rivers were largely formed from material brought down by them, and this material may have done duty many times before in past geological periods, for the sandstones of to-day are only the consolidated lake, sea, or aeolian sands of Cretaceous, Triassic, Carboniferous, or older times. The Glacial Period, too, left behind enormous quantities of loose friable material containing much fine gravel and sand. Though the great majority of dunes in temperate regions are formed of siliceous material, yet we have in the West of Ireland and in Devon and Cornwall some areas of more or less calcareous dunes formed mainly from fine shell débris, urchin tests and spines, and foraminifera. The best-known of these are the Campion Sands at Rosapenna, and the famous foraminiferal sands at Dog's Bay, Connemara. After a detailed account of the vaster sand regions of the world, in Arabia, Persia, Central Asia, Western Australia, and Peru, Mr. Welch went on to say that vegetation greatly assists dune formation, and in our country Bent, Marram, or Star-grass is the chief assistant to the wind as a dune-builder. The Sand Sedge also assists very much in the flatter areas. Many of the plants which live on sand-hills possess long roots or spreading rhizomes, and they probably act in a chemical as well as in a mechanical way, especially where calcareous matter is present. Other typical plants of the sand dunes in the British Isles are the Sea Buckthorn, Ragweed, Field Thistle, Burdock, Sea Holly, Sea-Kale, Wall Pepper, Sea Purslane, and Sea Convolvulus. The damper areas of sand have a flora of their own—Mints, Grass of Parnassus, &c. When the natural vegetation of a dune area is broken through by man, rabbits, or cattle, or destroyed in any way, the sands often start to drift inland over cultivated areas and great devastation in all parts of the world has been caused in consequence. Perhaps the Landes area in western Gascony is the best-known European example, and the Culbin Sands in Scotland the most marked British one. One of the worst cases of devastation by blowing sands in Ireland occurred at Rosapenna, Donegal. Here the Campion Sands from the great dunes which fringe Tramore, Sheephaven, covered and destroyed sixteen farms and Lord Boyne's house and grounds in 1784. The sands passed over the high garden wall, partly filling the garden, right over the hill above, and down to Mulroy Bay. These light calcareous sands are composed of finely comminuted shells, sea-urchins, and foraminifera from Tramore, and even now have to be carefully watched, especially on the golf links, in dry windy seasons. Further up the peninsula the Tranarossan sand-flat is the last stage of a dune area, from which the dunes on the western side have been blown clean across the isthmus into Mulroy Bay, some remnants of old land-shells deposit being all that is left on the west side above the general level of the plain. The highway is now many feet below the present sand level. Rutland Island, Burtonport, West Donegal was completely devastated by blowing sands between 1806 and 1846. It was a green island, a thriving fishing station, the herring fishery in 1784 yielding £80,000, and the Government established a military station there.

In forty years the sand had completely buried the place, only the chimney of the school showing above it. At Horn Head part of the road is completely buried, and the sand has drifted up the hill to an altitude of 350 feet. It has buried many large fields once cultivated here. In south-west Mayo the inhabitants near the shore have great difficulty in keeping the sand from travelling inland. At Dooaghty, west Mayo, great changes have taken place in the last 50 years. Kinahan, in "Geology of Ireland," states that near Broadhaven the Bent was burnt off the sand-hills, and the sand commenced to travel up the hill to the north-east. In 1878 it had crept up 700 feet, destroying all before it, and the occupiers had to move to the other side of the hill. In Omey Island, off the Galway coast, the sand has covered up a village, and the natives now come out of holes like rabbits out of a burrow. In Inishmore, Aran, and at Errismore, sands are travelling southward out to sea. At Arklow the great dunes have almost disappeared. At Culbin, in Scotland, blown sands overwhelmed an estate that was rented at £6,000 per annum. In the Kurische Nehrung, a long narrow sandy neck of land on the north coast of Germany, blowing sands buried, and then left free, a church. The Merthyr Mawr sand-hills is Glamorganshire cover an old town, the Corporation and mace of which still exist. Blown sands have consolidated and form building-stone in Cornwall and north Devon. Some consolidation has taken place in western and northern Irish sand-hills; good examples occur at Portsalon, Pollan Bay, and on the Sligo coast.

The lecture was illustrated by over 80 lantern slides, taken mainly by the lecturer; by a number of dune-building plants sent by Mr. Manning, of Rosapenna, to show the long creeping roots, and a large series of land shells which live on sandy areas, exhibited by Arthur W. Stelfox. At its conclusion Dr. Dwerryhouse, F.G.S., addressed the meeting, and, after the President's reply, the election of a new junior member terminated the proceedings.

NOVEMBER 29.—GEOLOGICAL SECTION.—Lecture by Dr. A. R. DWERRY-HOUSE, F.G.S., on "Water supply from underground sources," illustrated with lantern slides. W. J. C. Tomlinson, Chairman of the Section, presided. Dr. Dwerryhouse called attention first to the fact that water supply from underground sources was equally dependent upon the rainfall, with that obtained from surface streams, though it often happened that the fall of level of underground water did not take place for some considerable time after the drought to which it was due had ceased. Thus in estimating the possible supply from wells, it was necessary not only to consider the area over which the rock yielding the water occurred at the surface, but also the amount of rainfall available. This involved a knowledge of the mean annual rainfall of the district, the amount of run-off by brooks and rivers and the amount of evaporation, including vegetable transpiration, since the amount of percolation is the annual rainfall, less the run-off and evaporation. The relative amount of water passing away by streams, evaporation, and percolation varied much in different localities, being dependent upon climate, the slope of the ground and the nature of the rocks. As the result of experience it was usual for purposes of water supply to make a deduction from the mean annual rainfall of one-fifth or

one-sixth to allow for the effects of three consecutive dry years. As a general guide it was stated that the estimate of the amount of percolation in Britain was from one-fourth to one-fifth of the rainfall, though in some districts it was much lower. The methods in use for the gauging of streams and the estimation of evaporation and percolation were described, and the changes in form and level of the plane of saturation or "water-table" discussed.

Experimental work on the flow of water in limestone rocks which was carried out by the speaker in the Ingleborough district of Yorkshire, under the auspices of the British Association and the Yorkshire Geological Society, was dealt with and the general conclusions arrived at were described. A discussion followed, in which R. Welch, W. Gray, S. A. Bennett, G. Donaldson, and the Chairman took part.

DUBLIN NATURALISTS' FIELD CLUB.

JUNE 24.—EXCURSION TO RYE WATER, LEIXLIP.—A small party travelled to Lucan by the electric tram and walked to Leixlip through the Vesey Demesne. In the deinesne a pit excavated in the river-gravels was examined, and the conductor, J. de W. Hinch, pointed out the presence of far-travelled boulders from the north of Ireland, and also of shell fragments which indicated that these river-gravels had been derived from the Glacial drift. From Leixlip the Canal was reached at Cole's bridge and the party then walked along the north bank to Rye Water. Heavy rain was now falling, and it was found impossible to do any botanical work, but the general geological features of Rye Water were pointed out, and a interesting formation of calc-sinter was examined. The party then returned to Lexlip by road.

SEPTEMBER 9.—EXCURSION TO MALAHIDE.—About 20 members travelled to Malahide under the leadership of J. Bayley Butler, M.A., M.B., for the purpose of dredging the Sound for marine animals; this they did for 2½ hours, but, with the exception of a few nudibranchs collected by N. Colgan, M.R.I.A., nothing of special interest was found. They returned to town by the 5.30 p.m. train.

OCTOBER 7.—EXCURSION TO AVONDALE, CO. WICKLOW.—Fifteen members left Harcourt Street station at 10.15 a.m., for the Avondale Forestry Station, and upon arriving at Rathdrum, walked out to Avondale, where they were met by J. Black and A. C. Forbes. Fortunately the weather, which had been very bad in the morning, cleared up in the afternoon, and enabled the members to inspect the various experimental plots which are now beginning to form objects of interest to the forester and arboriculturist. The effects of a severe frost experienced on June 15th, when the exposed thermometer fell to 12° F. below freezing point, were still visible on Spruce, Douglas Fir, Spanish Chestnut, and other species, but apart from this, the growth of most trees during the summer had been good in spite of the severe drought which had characterised the season of 1911. Avondale House, with its museums, class-rooms, &c., was seen,

as well as the collections of Irish-grown timbers which has been got together during the last two years, and which is housed in a separate building. The nursery was also visited, in which a large number of species of more or less economic importance are being raised for trial on an extensive scale. The return to Dublin was made at 6.8, after tea had been taken in the Station Hotel.

OCTOBER 24.—The Twenty-sixth Winter Session was opened with a Conversazione in the house of the Royal Irish Academy, Dawson Street, under the presidency of R. J. USSHER, D.L., M.R.I.A. The attendance was not so large as that of the previous year, only 109 members and visitors being present. At 8.30 p.m., the chair was taken by the President, and the formal business of the evening having been transacted, Professor J. ALFRED SCOTT, M.D., delivered a popular lecture on "Notables of the Zoo," which was illustrated by lantern slides, and was much appreciated by the audience.

As usual, a number of scientific objects were on view during the evening, affording a good deal of interest. These included the following :—

Miss S. Bernard : A green stone from New Zealand. J. Bayley Butler, M.A., M.B. : Living Specimens under the Stereoscopic Microscope. Professor G. H. Carpenter, B.Sc., and Miss M. C. McDowell, A.R.C.S.I. : Some Beetle Grubs and their Jaws. Professor Grenville A. J. Cole, F.G.S. : Model of the S. E. of the Isle of Skye, by R. F. Gwinnell, F.G.S., with Photographs illustrating scenery of igneous rocks contemporaneous with those of Carlingford and the Mourne. A. Cooley : Exhibits of Working Bees. A. Dingwall : Some County Dublin Seaweeds. G. P. Farran, B.A., and R. Southern, B.Sc. : Irish Marine Animals. W. F. Gunn : (a) Some Photomicrographs of Seeds; (b) Some Lichens which infest Fruit Trees; (c) Microscopic Exhibit. J. N. Halbert, M.R.I.A. : Nest of Long-tailed Titmouse. J. N. Halbert, M.R.I.A., and C. M. Selbie, B.Sc. : Crabs with Sponge and Seaweed growths. Miss E. J. Haughton : Geological Specimens. J. de W. Hinch : Glacial Erratics from Tory, Co. Donegal. I. Pennick Jones : Autumn-tinted Foliage. Miss M. C. Knowles : Lichens used in dyeing. D. McArdle : Rare Mosses and Liverworts collected in Ireland. L. McLaren : A collection of Irish Grasses. Miss C. McNab : Newts (*Spelerpes fuscus*) from Sardinia. A. R. Nichols, M.A., M.R.I.A. : A White-legged Falconet from Assam. George Ryce, B.A., F.C.S., J.P. : Specimens of Potash Minerals and Potash Manures from the German Potash Mines. A. Roycroft : (a) Glencullen Granite, containing Beryl and Tourmaline; (b) Named collection of small Shingle from Ardgillan Beach. R. F. Scharff, Ph.D., M.R.I.A. : Models of jaws of Primitive Man. Norman E. Stephens : (a) Some Irish Terrestrial Isopods; (b) *Chelifer Godfreyi*, Kew—a recently described False-Scorpion. R. J. Ussher, D.L., M.R.I.A. : A Specimen of the Black-tailed Godwit. Miss Edith H. Wilson : (a) A Sparrow Hawk (b) Lace Bark from S. Africa. W. J. Williams : Sabine's Gull (Co. Westmeath); Great Snipe (Co. Galway); Wasps' Nest (Co. Waterford).

NOVEMBER 18.—EXCURSION TO HOWTH.—A party of thirteen assembled at Amiens Street Station and proceeded to Howth by the 12.50 p.m. train. The chief object of the excursion was the collection of Fungi, and Mr. J.

Adams acted as conductor. The woods surrounding Howth Castle proved a suitable hunting-ground, and although it was rather late in the season, still a good many species were collected. The following species were found—*Nectria cinnabrina*, *Hypholoma fascicularis*. Shaggy Caps (*Coprinus comatus*), Fly Agaric (*Amanita muscaria*), Jew's Ear (*Hirneola Auricula-judæ*), Dryad's Saddle (*Polyporus squamosus*), Sycamore Leaf-blotch (*Rhytisma acerinum*) Candle-snuff Fungus (*Xylaria Hypoxylon*). In the pasture field a few specimens of the Common Mushroom (*Psalliota campestris*) were obtained. Pieces of wood were found coloured bluish-green by *Chlorosplenium aeruginosum*, and the alga *Chroolepus aureus* was observed. A considerable number of doubtful species were sent away for identification. When the party had reached the Cromlech, a violent shower passed over which had the effect of bringing collecting operations for a time to a standstill although no rain fell in Dublin. The party shortly after returned to town by the 5.0 p.m. train from Howth.

NOTES.

BOTANY.

Donegal Plants.

It might be of interest to mention that at Killybegs, Co. Donegal, during the last week of October, I counted 72 species of plants in flower within two miles of Roshin; also that last summer I have seen another field fairly full of *Sisyrinchium angustifolium*, some two miles from the previously recorded locality. (See *I. N.*, xviii., 222, xx., 64.)

CHRIS. A. CHEETHAM.

Farnley, Leeds.

Plants from Western Ireland.

Professor Hugo Glück, the well-known authority on water-plants, who visited Ireland last August, has sent me some notes on plants observed by him, from which I extract the following:—At the N.W. corner of Glendalough Lake (close to Recess Station), and just south of Weir Bridge, there is an unusually rich aquatic vegetation, which includes *Subularia aquatica*, *Helosciadium inundatum*, *Lobelia Dortmanna*, *Littorella lacustris*, *Alisma ranunculoides* (f. *zosterifolius* Fries), *Eriocaulon septangulare*, *Pilularia globutifera* (f. *natans* Mérat), *Is etes lacustris*, and *I. echinospora*. On both sides of the River Shannon, above Athlone, were noted *Callitricha autumnalis* (new to Westmeath and Roscommon), *Helosciadium inundatum* var. *Moorei*, and *Alisma ranunculoides* var. *repens* Cavini; the last also at Claremorris and f. *zosterifolius* Fries of the same species at Craigga More Lcugh, Connemara. *Isoetes echinospora* was found in Sraheens Lough, Achill Island.

R. LLOYD PRAEGER.

Dublin.

West Mayo Plants.

A couple of days spent in the Louisburgh district in the middle of October, though not mainly devoted to botany, resulted in the finding of a few plants which are worth recording. Lough Brawn (pronounced Avrawn) is a little tarn lying at about 1,400 feet at the head of a narrow cliff-walled valley on the north slope of the Sheffry group of mountains. The tarn itself contains nothing but *Sparganium affine*, but the cliffs above yield a delightful group of alpine plants, and appear to have been overlooked by botanists, escaping even the keen eye of H. C. Hart when engaged on his close examination of the alpine flora of Mayo and Galway. The "Highland" plants occurring here are eleven in number :—*Thalictrum alpinum*, *Saxifraga stellaris*, *Sedum Rhodiola*, *Saussurea alpina*, *Hieracium anglicum*, *Oxyria digyna*, *Salix herbacea*, *Juniperus nana*, *Asplenium viride*, *Aspidium Lonchitis*, *Selaginella selaginoides*. Of these, the only previous Mayo station for *Thalictrum alpinum* (which is abundant over L. Brawn) is Croaghpatrick, and for *A. Lonchitis* the recently published one on Clare Island. With the alpines occurred *Rubus saxatilis*, *Cystopteris fragilis*, and *Polypodium Phegopteris*, and of course plenty of the ubiquitous *Saxifraga umbrosa* and *Hymenophyllum unilaterale*.

Of other plants, *Utricularia ochroleuca*, hitherto in Ireland recorded only from West Galway, was obtained at Lugaloughan, a couple of miles to the north-east; *Elatine hexandra*, unrecorded from West Mayo, was seen in Loughnahaltora to the north-west, and in the slightly brackish Roonah Lough on the coast; and away to the eastward, beyond Westport, *Ulmus montana*, also new to West Mayo, grew unquestionably native on the limestone cliff which overhangs the Caves of Aille.

R. LLOYD PRAEGER.

Dublin.

ZOOLOGY.

Rare Birds in Ireland.

An immature specimen of Sabine's Gull was shot on Lough Derg, 3rd October, 1911. An Avocet was shot near Broadway, Co. Wexford, on the 1st November, after a heavy gale from the west. A Great Snipe was shot at Monivea, Co. Galway, by J. M. Meldon, on 5th October, 1911.

The second occurrence of Richard's Pipit was noted on 23rd October, 1911, the specimen being caught in a lark net by the same bird-catcher who captured the first specimen taken in Ireland. The second specimen was caught in a field near Kilbarrack Church, on the road to Howth, and was brought to me within an hour of capture.

A specimen of the Red-necked Phalarope was shot near Broadway, Co. Wexford, on 10th November, 1911. Although now breeding in the West of Ireland, this species has only in one other occasion been noted in winter, viz., 13th November, 1891.

W. J. WILLIAMS.

2 Dame Street, Dublin.

Notices of Irish Birds.

Recent numbers of contemporary journals contain the following notices of Irish birds :—Common Scoter (*Oedemia nigra*) again breeding in Ireland (H. Trevelyan, in *British Birds* for August); Great Black-backed Gull (*Larus marinus*) nesting on inland lakes (R. Warren in *Zoologist* for September, H. Trevelyan in *British Birds* for October, and J. Steel Elliott in *Zoologist* for October); the same species increasing as an Irish bird (R. J. Ussher in *British Birds* for November); White Wagtails (*Motacilla alba*) seen or migration in Co. Wexford in September (H. F. Witherby in *British Birds* for December), and at Bartragh Island, north Mayo, in August (R. Warren in *Zoologist* for October); White-tailed Eagle (*Haliaëtus albicilla*) no longer breeding in Ireland, and notes on the decrease of the Golden Eagle (R. Warren in *Zoologist* for September, and F. C. R. Jourdain in *British Birds* for October); Sooty Shearwaters (*Puffinus griseus*) seen off the Mayo Coast (the Duchess of Bedford in *British Birds* for October). With respect to the recent discovery of the Fulmar breeding in Ireland, H. F. Witherby offers some comments in *British Birds* for October, and in the same journal for December R. J. Ussher has a note on the Irish name (Cawnoge) of this bird. To the *Selborne Magazine* for October, Henry Garnett contributes an illustrated paper entitled “Nature Notes from the Irish Coast,” dealing with observations, chiefly of birds, made at Dunmore, Co. Waterford.

GEOLOGY.**Marine Shells in Inland Kitchen-middens.**

In corroboration of Mr. Hinch's interesting paper (*supra*, p. 189), I can state that in my several cave explorations I have almost invariably found sea-shells in caves that had been inhabited by man. In the kitchen-midden of the Carrigmurish near Whitechurch (between one and two miles from Cappagh) I found shells of oysters, limpets, whelks, cockles and scallops associated with pebbles specially selected from the sea gravels, of which there are examples in the National Museum. The Carrigmurish is six miles from Dungarvan Harbour. In the Ballynamintra cave, still further inland, I found mussels and limpets. Oysters and other marine shells were found in the Edenvale and Newhall caves near Ennis in Co. Clare, and in my experience are of common occurrence in the kitchen-middens of the ancient Irish, showing how fond they were of shell-fish for food. It is only near the sea, however, as at Shandon near Dungarvan, and among the sand-dunes, that I have met with continuous layers of shells, which are the chief indications of ancient settlements, and are associated with bones of mammals and fishes, and burned stones.

R. J. USSHER.

Cappagh, Co. Waterford.

NOTES ON WEST GALWAY LICHENS.

BY M. C. KNOWLES.

Last summer I spent a fortnight in West Galway with some friends who had rented Cleggan House for the month of August. During my visit I did some desultory collecting among the Lichens and Flowering Plants. I shall deal only with the results of my Lichen collecting in this short paper. These have turned out much more interesting than I expected.

County Galway, Mr. Adams' Cr, is the best worked for Lichens of the 12 sub-provinces into which he divides Ireland, having a total of 466 recorded species. Our knowledge of the Lichens of this district is due chiefly to Charles Larbalastier, though Wade, Isaac Carroll, and other Irish botanists have also contributed to it, but in a lesser degree. In the seventies of last century Larbalastier made several tours in Connemara and one has only to turn over the leaves of the Lichen Floras of the British Isles to see that he found it a veritable mine of new and interesting species. Leighton in the Introduction to the 3rd edition of his "Lichen Flora of Great Britain" refers to "the marvellous discoveries of Mr. Larbalastier in the west of Ireland," and no wonder, for in the body of the book more than 100 species are recorded from Connemara, on his authority, that are found nowhere else in the British Isles; many of these being species hitherto undescribed. As Kylemore, Letterfrack, Renvyle, Ballynakill, &c., places within easy reach of Cleggan, and Cleggan itself, occur frequently as the localities in which these new and rare Lichens were collected, I did not expect to be able to add many rare species to those already recorded. The earlier lichenologists, however, were often more concerned with collecting rare species than with noting the commoner ones, and a study of Mr. Adams' paper "The Distribution of Lichens in Ireland" showed me that such was the case in this district. I therefore turned my attention to trying to find some of the species that were not in the Connemara list, but of frequent or general oc-

currence in other parts of the country. A large proportion of the missing species were corticolous, which at once explains their absence, as Connemara is an almost treeless waste from end to end and there is no suitable habitat for them to grow on. I succeeded however in finding eight of these, *Pyrenula nitida*, *Ramalina fastigiata*, *R. evernioides*, *Parmelia caperata*, *Lecanora pallescens*, *L. intumescens*, *Opegrapha betulina* and *Pertusaria velata*, in a small plantation of young trees, chiefly Ash, Sycamore and Alder, which surrounds Cleggan House. The Ivy on the walls of the house yielded three others—*Physcia pulverulenta*, *Lecanora varia* and *Arthopyrenia cinereopruinosa*; and a very interesting little group, belonging chiefly to the genus *Bacidia*, was found on the dead stems in the centre of a very fine Hydrangea bush in the garden, making in all 15 species. The other additions to the Connemara Lichens are saxicolous forms with the exception of three species of *Cladonia*.

The rock of the Cleggan peninsula is chiefly a hard close-grained gray quartzite which does not readily crack or weather into rough surfaces that would retain moisture and give a favourable surface for Lichens to grow on, so that on the hill-side there did not seem to be the same luxuriant Lichen-growth that was so noticeable in north Mayo about Louisburgh and on Clare Island. This may have been partly due to the dry hot summer. The Peltigeras were very scarce and difficult to recognise amongst the parched grass. *Cladina sylvatica* was frequent but not abundant, occasional patches of *Cladonia gracilis*, *C. coccifera*, *C. pungeans*, &c., were noticed in bare spots amongst the heather, *Parmelia prolixa* on the flat surfaces of the rocks, and *Parmelia ciliata* on mossy stones. Of the saxicolous lichens, *Rhizocarpon geographicum* and *Lecidea rivulosa* were perhaps the most abundant species, and ranged from the top of the hill to the shore, where side by side they covered boulders that must have been frequently wetted by the sea. Some of the patches of *Rhizocarpon geographicum* were stained a beautiful pale blue colour and at first sight seemed to be another species. When looked at under the microscope the thallus of the stained portions was seen to be more or

less disorganized. The apothecia too were imperfect, but a few spores were found identical with those of *Rhizocarpon geographicum*. In part II. of the "Monograph of British Lichens," Miss Smith says the medulla of *R. geographicum* is stained blue by iodine. It may be, therefore, that the blue colour of the Cleggan specimens was caused by decaying seaweeds or perhaps by iodine in solution in the sea-water. The blue patches were seen only on the shore.

The Lichens on the shore were more abundant and noticeable than on the hill-side owing to the prevalence of moister conditions. In the upper part *Ramalina scopulorum* was very common, covering almost every rock and cliff. Occasional tufts of *R. cuspidata* and *R. Curnowii* were associated with it. On a wall facing west, *R. subfarinacea* grew plentifully. *Physcia aquila*, *Lecanora protrusa* and *L. atra*, with *L. ferruginea* and other crustaceous forms, made a kind of undergrowth to the Ramalinas, which seemed to flourish best on the sides of the rocks and walls facing the prevalent winds. *Physcia parietina* and *Lecanora lobulata*, with *L. murorum*, were specially noticeable on rocks with a southern aspect; *Buellia canescens* on the contrary seemed to prefer the shade. Many other species were gathered on the shore above high tide-level, including *Buellia atroalba*, *B. colludens*, *Lecanora caesiorufa*, and *L. prosechoides* with *Arthonia varians* parasitic upon it.

Several very rare species were got between the tides, the two most interesting being *Verrucaria striatula* and *Arthopyrenia foveolata*, both of them new to Ireland. *Verrucaria striatula* occurred on the perpendicular faces of the rocks, generally in the more exposed situations, associated with *Lichina pygmaea* and *Verrucaria mucosa*. It was not uncommon on the southern shore of the peninsula, and I also collected it at Ballynakill on the northern side. This species has a very limited distribution in the British Isles, the only records being from the Channel Islands and south England, where it was said to be rare. The thallus is very characteristic and the lichen is easily recognisable in the field.

Arthopyrenia foveolata, A.L.Sm., is a species that has recently been described by Miss Smith from material collected by Mr. E. M. Holmes at Robin Hood's Bay,

Yorkshire. Mr. Holmes found it on shells on the sea-shore. At Cleggan it is very abundant both on live and dead barnacles and almost always associated with colonies of *Rivularia atra*. It is a perforating lichen and is very easily overlooked, its thallus and very minute perithecia being embedded in the substance of the shell, the latter appearing at the surface as very minute black dots. I have collected it at various other places round the coast of Ireland and expect it is much more common than it is generally thought to be. I have found it only on barnacles.

On old walls south of the village, *Lecanora parella*, various *Physcias*, and *Parmelias*, flourished exceedingly. Among the *Parmelias* *P. caperata*, *P. Borreri* and *P. ciliata* are new records for CI, while *Parmelia revoluta* and *P. laevigata* found chiefly on the shady sides of the walls have been noted only from one other locality in this district.

There are two small outcrops of limestone in the neighbourhood of Cleggan, one close to the bay and the other further inland at Ballynakill Lake. Some of the specimens I got at Ballynakill have proved very interesting, one of them, *Polyblastia Schraderi*, being new to Ireland, and like the other species new to Ireland which I record, it has a very limited distribution in England. On the same rocks *Lecidea immersa*, *L. Metzleri*, *Verrucaria calciseda*, and *Biatorina episema*, parasitic on the thallus of *Lecanora calcarea*, were abundant.

During my stay at Cleggan we made an expedition to High Island and spent a couple of hours there. This island is accessible only in the very calmest weather. The chief part of my time was taken up making a list of the Flowering Plants but several Lichens were also noted. One of them, *Physcia flavicans*, has its only other station in the west of Ireland on the Blasket Islands off the coast of Kerry. It grew sparingly at the foot of some rocks among moss on the south-west part of the island. The remarkable feature of the Lichens on High Island was the abundance of *Ramalina Curnowii*. It covered almost every rock with its tufts, and caused them to stand out conspicuously from the sward, which was eaten as smooth as a table by the numerous sheep that had been turned on the island.

Besides the Cleggan, Ballynakill and High Island Lichens there are several in the list which were gathered at Carna and in the neighbourhood of Roundstone in July, 1910, but held over as being too few to publish by themselves. Among them are *Usnea hirta* and *U. florida*, corticolous species which here, as on Clare Island, in the absence of trees, were growing on rocks.

Altogether from the various localities mentioned, there are 48 species and 6 varieties new to Co. Galway (CI of Mr. Adams' list). Of these, 3 species and one variety are new to Ireland. All the others on the list have had previously either only a vague record from the district such as "Connemara" or "Co. Galway" or they have been known only from a single locality.

In compiling the list I have followed the plan adopted in the paper on the Clare Island Lichens, and used the classification of Parts I. and II. of the "Monograph of British Lichens."

I owe many thanks to Miss Lorrain Smith for examining several of the specimens and confirming my identifications, and also to Mr. West for identifying *Rivularia atra*.

The lichens new to CI have an asterisk placed in front of their names, while those new to Ireland have a dagger prefixed.

Lichina confinis Ag.—Rocks about high tide marks, Cleggan; High Island.

pygmaea Ag.—Rocks between tide marks especially in exposed situations, Cleggan; High Island.

***Coilema cristatum** Hoffm.—On walls, Cleggan.

granuliferum Nyl.—On limestone, Ballynakill.

multipartitum Sm.—On limestone, Ballynakill.

Sphaerophorus compressus Ach.—On rocks, Carna.

coralloides Pers.—On rocks, Carna.

Stereocaulon coralloides Fr.—On rocks Craigga More.

denudatum Floerke.—On rocks, Urrisbeg.

Cladonia cervicornis Schaer.—On the ground and in crevices of rocks, Cleggan Hill; Craigga More.

***cladonia coccifera** Schaer.—Bare places among heather, Cleggan Hill; Carna bog.

***cornucopioides** Fr.—Earthy places on walls, Carna.

- Cladonia furcata** Hoffm.—Cleggan Hill, Carna.
 subsp. **racemosa** Nyl.—On the ground among heather, Carna bog.
 var. **recurva** Hoffm.—On the ground, Carna.
***gracilis** Hoffm.—On the ground, Cleggan Hill.
maellentia Hoffm.—Bare places among heather, Urrisbeg.
pungens Floerke.—Cleggan Hill.
pyxidata Fr. var. **chlorophaea** Floerke.—On the ground among mosses, Carna.
***sobolifera** Nyl.—On mossy rocks, Carna.
squamosa Hoffm.—On the ground, Cleggan Hill.
verticillata Floerke.—On rocks, Carna bog.
Cladina sylvatica Nyl.—Cleggan Hill; Urrisbeg.
uncialis Nyl.—Damp places, Cleggan; Carna bog; Urrisbeg.
***Ramalina Curnowii** Cromb.—Maritime rocks, Cleggan; High Island.
 ***cuspidata** Nyl.—Exposed maritime rocks, Cleggan.
***evernioides** Nyl.—On Scotch Fir, Cleggan.
farinacea Ach.—On Scotch Fir and Holly, Cleggan.
***fastigiata**, Ach.—On Sycamore, Cleggan.
Ramalina scopulorum Ach.—On exposed maritime rocks, Cleggan; High Island; Carna.
 var. **inerassata** Nyl.—On maritime rocks, Cleggan; High Island.
***subfarinacea** Nyl.—Old wall facing west, Cleggan; Carna.
Usnea florida Ach.—On rocks, Carna.
***hirta** Hoffm.—On rocks, Carna.
Parmelia Borreri Turn.—On walls south of Cleggan.
***eaperata** Ach.—On trees and rocks, Cleggan.
conspersa Ach.—On flat surfaces of rocks, Cleggan Hill.
exasperata Nyl.—On trees, Cleggan.
fuliginosa Nyl.—On walls, Cleggan.
laevigata Ach.—Old walls, Cleggan; mossy rocks, Craigg More; Carna.
omphalodes Ach.—Cleggan Hill; High Island.
perlata Ach.—On Sycamore and rocks, Cleggan; High Island; Carna.
 subsp. **ciliata** Nyl.—Mossy rocks, Cleggan; High Island; Carna.
prolixa Nyl.—Rocks near the shore, Cleggan.
revoluta Nyl.—On shady walls, Cleggan.
saxatilis Ach.—On rocks and trees, Cleggan; High Island; Carna.
***sulcata** Tayl.—On walls south of Cleggan.
Peltigera horizontalis Hoffm.—On mossy rocks, Cleggan Hill.
polydactyla Hoffm.—Among grass, Cleggan; Carna.
rufescens Hoffm.—On mossy rocks near the shore, Cleggan.
Physcia aquila Nyl.—Shore, Cleggan; High Island.
***flavicans** DC.—On rocks, High Island.
parietina De Not.—Walls and rocks, Cleggan; Ballynakill; High Island.
 *var. **ectanea** Nyl.—On limestone, Ballynakill.
***pulverulenta** Nyl.—On Sycamore and Ivy, Cleggan.

- Physcia stellaris** Nyl.—On trees, Cleggan
 subsp. **tenella** Nyl.—On walls, Cleggan.
- ***Pannularia nigra** Nyl.—On limestone, Ballynakill.
 *subsp. **psotina** Cromb.—On limestone, Ballynakill.
- Lecanora atra** Ach.—Abundant on rocks on the shore, Cleggan.
aurantiaca Nyl.—On Ash, Cleggan.
- ***caesiiorufa** Nyl.—On maritime rocks, Cleggan.
- cerina** Ach.—On Ivy stems, Cleggan.
- citrina** Ach.—On wall, Cleggan.
 f. **depauperata** Cromb.—High Island.
- crenulata** Nyl.—On limestone, Ballynakill.
- ferruginea** Nyl.—On rocks, Cleggan.
- galactina** Ach.—On limestone, Ballynakill.
- ***glaucoma** Ach.—On walls, Cleggan.
- ***intumescens** Koerb.—On Sycamore, Cleggan.
- ***irrubata** Nyl., var. **incrustans** Cromb.—On limestone, Ballynakill.
- ***lobulata** Somm.—Abundant on rocks on the shore, Cleggan.
- muronorum** Ach.—On rocks on the shore, Cleggan; High Island,
 and on limestone, Ballynakill.
- ***pallescens** Nyl.—On Sycamore, Cleggan.
- parella** Ach.—Abundant on walls and rocks, Cleggan.
- polytropa** Schaer.—Rocks, Cleggan; High Island.
- ***prosechooides** Nyl.—On rocks on the shore, Cleggan.
- smaragdula** Nyl.—On rocks, Cleggan.
- subfusca** Nyl.—On Ivy stems, Cleggan.
- sulphurea** Ach.—On maritime rocks, Cleggan.
- sympagea** Nyl.—On limestone, Ballynakill.
- ***varia** Ach.—On Sycamore and Ivy, Cleggan.
- ***vitellinula** Nyl.—On limestone, Ballynakill.
- Pertusaria ceuthocarpa** Turn. & Borr.—On rocks, Cleggan.
concreta Nyl.—On rocks, Cleggan.
- ***leioplasca** Schaer. f. **hexaspora** Nyl.—On Sycamore, Cleggan.
- ***velata** Nyl.—On Sycamore, Cleggan.
- Gyalecta exanthematica** Fr.—On limestone, Ballynakill.
- Leidea albocoeruleascens** Ach.—On rocks, Cleggan; Ballynakill.
confluens Ach.—On rocks on the shore, Cleggan.
- ***immersa** Ach.—On limestone, Ballynakill.
- ***Metzleri** Th. Fr.—On limestone, Ballynakill.
- parasema** Ach.—On Sycamore, Cleggan.
- protrusa** Fr.—On rocks on the shore, Cleggan; High Island.
- ***rivulosa** Ach.—On rocks, Cleggan.
- Biatorina chalybeia** Mudd—On rocks, Cleggan; Ballynakill.
episema A. L. Sm. (on *Lecanora calcarea*)—Ballynakill.
- lenticularis** Koerb.—Abundant on the shore, Cleggan; on limestone,
 Ballynakill.
- Billimbia aromaticia** Jatta.—On walls, Ballynakill.
- ***Bacidia arectina** Branth. & Rostr.—On Hydrangea and Sycamore,
 Cleggan.

- ***Bacidia atrogrisea** Arnold.—On Hydrangea and Sycamore, Cleggan.
- *var. **laurocerasi** A.L. Sm.—On Hydrangea and Sycamore, Cleggan.
- flavovirescens** Anzi.—On soil, Carna bog.
- umbrina** Branth. & Rostr.—On Hydrangea and Sycamore, Cleggan.
- Buellia atroalba** Th. Fr.—On rocks, Cleggan ; High Island.
- ***canescens** De Not.—On rocks on the shore, Cleggan.
- colludens** Tuckerm.—On rocks on the shore, Cleggan ; High Island.
- confervoides** Krempelh.—On rocks, Cleggan ; High Island.
- ***stellulata** Mudd—On rocks, Cleggan.
- ***Rhizocarpon alboatrum** Th. Fr.—On rocks on the shore, Cleggan.
- var. **epipolia** A.L.Sm. On bark, Cleggan.
- ***confervoides** DC.—Wall, Cleggan.
- geographium** DC.—On rocks, Cleggan.
- ***petraeum** Massal.—On rocks, Cleggan ; Ballynakill.
- ***Arthonia subvarians** Nyl. (on *Lecanora galactina*).—Limestone, Ballynakill.
- ***varians** Nyl. (on *L. prosechoides*).—Rocks on the shore, Cleggan.
- Opegrapha atra** Pers.—On Hydrangea and Ivy stems, Cleggan.
- ***betulina** Sm.—Bark, Cleggan.
- calcarea** Turn.—On rocks on the shore, Cleggan.
- varia** Pers.—On bark, Cleggan.
- vulgata** Ach.—On Ivy stems, Cleggan.
- Graphis scripta** Ach.—On Alder, Cleggan.
- Graphina anguina** Muell.-Arg.—On Sycamore, Cleggan.
- ***Verrucaria calciseda** DC.—On limestone, Ballynakill.
- ***coerulea** DC.—On limestone, Ballynakill.
- ***integra** Carroll—On wall, Cleggan.
- maura** Wahlenb.—On shore, Cleggan ; High Island.
- *var. **memnonia** Koerb.—Cleggan.
- ***microspora** Nyl.—On rocks between tide marks, Cleggan.
- mucosa** Wahlenb.—On rocks between tide marks, Cleggan.
- prominula** Nyl.—On rocks on the shore, Cleggan.
- var. **viridans** Nyl.—On shore, Cleggan.
- †**striatula** Wahlenb.—With *Lichina pygmaea* on rocks between tide marks.
- ***rupestris** Schrad.—On limestone, Ballynakill.
- †**Polyblastia Schraderi** A.L.Sm.—On limestone, Ballynakill.
- Acrocordia biformis** Oliv. var. **conformis** A.L.Sm.—On Hydrangea, Cleggan.
- ***Arthopyrenia cinereopruinosa** Koerb. var. **Hederae** Arn.—On Ivy and Hydrangea, Cleggan.
- epidermidis** Mudd.—On bark, Cleggan.
- †**foveolata** A.L.Sm.—On Barnacles, frequent round Cleggan Bay.
- ***litoralis** A.L.Sm.—On rocks with *A. foveolata*, Cleggan Bay.
- Porina carpinea** A. Zahlbr.—On Sycamore, Cleggan.
- chlorotica** Wainio.—On limestone, Ballynakill.
- ***Pyrenula nitida** Ach.—On bark, Cleggan.

ENTOMOLOGICAL NOTES FROM CO. GALWAY.

BY L. H. BONAPARTE-WYSE.

DURING a stay of some five weeks last summer in Co. Galway, I devoted a part of my time to collecting insects. I arrived in Galway town on June 16th, and stayed on till the 24th when I moved on to Clifden, where I was fortunate in obtaining suitable accommodation at Pier Cottage, the home of Mr. and Mrs. McDonnell, most worthy people, who did everything in their power to make me comfortable. In fact, so successful were they, that I remained a whole month—much longer than I had intended. From both these centres numerous excursions were made in different directions, and promising localities explored for entomological specimens, with some small measure of success. I have here pleasure in acknowledging with thanks Messrs. W. F. Johnson's and J. N. Halbert's kind help in determining species. I append a list of my more important captures. The species marked with an asterisk are new to Galway.

COLEOPTERA.—*Carabus catenulatus*, not uncommon near Ballynahinch, and at Clifden under stones; *C. clathratus*, one specimen near Roundstone; *Bradyceillus distinctus*, Clifden; *Bembidium monticola*,* *B. femoratum*,* Clifden—both these new to Connaught; *B. bipunctatum*, Clifden; *Ilybius obscurus*,* about half way up Benlettery, in a small boggy pool; *Acilius sulcatus*,* one male in a bog-hole near Roundstone; *Gyrinus marinus*,* several examples in a small lake about half way between Clifden and Ballynahinch; *Orechtochilus villosus*, one example clinging to a submerged stone in this lake; *Philonthus splendens*,* Clifden; *P. lucens*,* Ballynahinch; *P. quisquiliarius* var. *dimidiatus*,* one specimen, Moycullen, by sweeping; *Cafius fucicola*, Salthill; *Xantholinus glabratus*,* Clifden, common; *Lathrobium elongatum*,* Clifden; *Oxytelus sculpturatus*,* Moycullen; *O. complanatus*,* Roundstone and Clifden; *Hister carbonarius*,* Salthill, common; *Anatis ocellata*,* one specimen on the border of a fir-plantation near Moycullen—new to Connaught; *Brachypterus pubescens*,* Roundstone, by sweeping; *Aphodius fossor*,* Clifden;

Phyllopertha horticola, numerous at Moycullen, scarce elsewhere; *Cetonia aurata*—I joined an excursion to Inishmore on June 18th, chiefly with the object of obtaining a series of the lovely Rose-beetle. Most of the day was taken up by the sea-voyage, so there was little time for exploring the island. I succeeded in taking a solitary example in the lane leading up to the lighthouse. *Athous niger*, Moycullen, by sweeping; *Galerucella nymphaeae*,* *G. calmariensis*, Salthill, by sweeping; *Sphaeroderma cardui*,* Moycullen, two specimens; *Apion vorax*,* Moycullen, new to Connaught; *A. marchicum*, Roundstone, by sweeping.

LEPIDOPTERA.—*Argynnis aglaja* occurred rather freely during July in the vicinity of Clifden, especially in Clifden Castle demesne; I took two specimens at Roundstone on July 8th. *Vanessa io*.—I found the larvae of this handsome species in extraordinary abundance, and counted over a dozen colonies within a radius of two miles of Clifden. I also found colonies at Moycullen, Clarinbridge, etc. It would be of interest to learn whether the butterfly was equally abundant later on during the summer. *Lycaena (Zizera) minima*, one specimen at Clarinbridge, on June 23rd, and saw others; *L. icarus*, several blue females were taken at Clifden—one wholly so, except for the marginal row of orange spots. *Dicranura vinula*.—I found the caterpillars of the Puss Moth rather commonly near Clifden on dwarf sallow, and succeeded in getting them into the pupal state. *Cosmotriche potatoria*.—I took a caterpillar at Clarinbridge, nearly full fed, on June 23rd. The moth, a female, emerged on July 31st. *Phragmatobia fuliginosa*, *Parasemia plantaginis*, *Atolmis rubricollis*, single specimens of each at Clarinbridge. *Zygaena purpuralis*.—I found the Irish Burnet Moth in great abundance at Clarinbridge on June 23rd. It occurred over a large area, for I observed it in all suitable spots from Clarinbridge on to Ardrahan. The moth must have already been on the wing for some time, as most of the specimens were much worn. Its congener, *Z. filipendulae*, occurred very sparingly with it. *Agrotis lucernae*.—I met with this species on Benlettry on July 15th, flying in the sunshine. Its habits, as observed by me, are perhaps worthy of mention. The moths

congregate in little knots of three or four individuals on the edges of precipices or rough stony places, and fly with incredible swiftness to and fro within a circle of a few yards' diameter. When this charmed circle is approached too closely, another is formed in a similar spot, where the same merry gambols are kept up. I spent nearly an hour, so shy were they, in securing a couple of specimens. *Melan-thia (Mesoleuca) albicillata*, Clifden, one example; *M. bicolorata*, common in Clifden Castle demesne. *Acipitia pentadactyla*, Clifden, common.

Ealing Common, London.

THE SURVEY OF CLARE ISLAND.

REPORT OF PROGRESS DURING 1911.

BY R. LLOYD PRAEGER.

(A report laid before the Royal Irish Academy, 13th November, 1911).

THE third season's field-work began early. A. D. Cotton went west on February 13 to study the winter alga flora at Louisburgh and Achill Sound. He was followed on March 7 by G. H. Wailes and James Murray. The latter spent a week in collecting Bdelloid Rotifera and Arctiscoida in Achill, Clare Island, and the Louisburgh district. Mr. Wailes took up his residence on Clare Island, and remained there till June 3 working at the Rhizopoda, and collecting not only on Clare Island, but in Achill, at Roonah, and on Caher Island, Inishturk, and Inishbofin, the result being one of the most complete list of Rhizopods ever formed for a single district. He was joined for a few days in March by R. M. Barrington, who studied the birds of the island.

On April 13 J. S. Dunkerly and G. O. Sherrard went down for a week, and, using Belclare as head-quarters, collected Infusoria and Nematodes respectively.

The first combined party of the season left Dublin for the island on April 27. It included Sir H. C. Hawley

(Fungi), A. D. Cotton and Dr. F. Börgesen of Copenhagen (Marine Algae), F. J. Lewis (Peat deposits), R. Ll. Praeger, and several others. While most of the party returned at the end of a week, A. D. Cotton worked on at Louisburgh and Achill till May 15.

On May 29 Rev. W. F. Johnson and Mrs. Johnson went down, and spent a month, mainly on the island, collecting insects. In connection with the geological survey of the area, Newell Arber spent several days in June collecting Carboniferous fossils from the sandstones of the north-eastern part of the island. During the same month C. J. Patten again visited Clare Island in pursuance of his study of the birds ; and W. West paid a second visit of ten days' duration to complete his work on the fresh-water Algae.

A double party was arranged in July. On the 12th of that month Miss Stephens (Sponges), J. de W. Hinch (Glacial fossils), R. Ll. Praeger, and others went to the island. Advantage was taken of exceptionally calm weather to land and collect on Mweelaun, an isolated rock lying two miles south of Clare Island. This first party was followed five days later by a larger contingent, including R. J. Ussher and Pastor Lindner (Birds), W. F. de V. Kane (Lepidoptera), T. J. Westropp and Dr. G. Fogerty (Archaeology), Professor G. H. Carpenter (Aptera), J. S. Dunkerly (Infusoria and Flagellata), A. W. Stelfox (Land and Fresh-water Mollusca), G. O. Sherrard (Nematodes), and Professor Gwynne Vaughan (Botany) ; several of these had previously done some days' work on Achill. The break-up of the party was gradual, and while Kane, Dunkerly, Hinch, and Gwynne Vaughan subsequently worked at Louisburgh or Achill, Westropp, Fogerty, Stelfox, and Praeger sailed on to Caher Island, Inishturk, and Inishbofin (and Ussher and Lindner to the latter two), for the purpose of completing their survey by studying the insular areas adjoining the immediate scene of the main work ; results of very considerable interest were obtained. In the meantime J. N. Halbert was collecting Insects at Louisburgh, where he was joined by P. H. Grimshaw (Diptera), and a very good fortnight's work was carried out in that area.

On August 11th, E. Heron-Allen and Arthur Earland arrived at Mallaranny for the purpose of collecting Foraminifera. A. D. Cotton at the same time paid his final visit for Marine Algae, working first at Achill Sound, and subsequently on the island. The SS. "Helga," with G. P. Farran and R. Southern on board, came in, and dredging was carried on for some days. After the departure of the steamer further work was done, and the search for Foraminifera was extended as far south as the famous deposit of Dog's Bay near Roundstone.

The especially low spring tide of September was utilized by A. R. Nichols (Polyzoa) and N. Colgan (Mollusca) for collecting at Louisburgh, while Miss Stephens (Sponges) and Miss Knowles (Lichens) worked during the same period with the "Helga" staff at Blacksod; but tempestuous weather interfered to some extent with their researches.

During the same month D. R. Pack-Beresford spent a week working at the spiders of the district lying between Clew Bay and Killary Harbour.

At the beginning of October Mr. and Mrs. Carleton Rea (Fungi), and Miss Lister (Mycetozoa), went to Westport, where they were joined for two days by R. Ll. Praeger, and vigorous exploration of the adjoining woods was carried out for a period of ten days. Miss Stephens was at the same time at work at Fresh-water Sponges in the Newport area. Later, joined by R. Ll. Praeger, dredging for Sponges, &c., was carried out in lakes in the Louisburgh and Westport areas; owing partly to stormy weather, and partly to the nature of the lake-bottoms, which generally consisted either of boulders or deep peat mud, this work proved difficult and not productive of much material. The last visit paid to the district during the year was on November 11, when A. W. Stelfox and R. Ll. Praeger worked at Manulla, investigating the lake-marls, and making sections of them in order to throw light on the past history of the fresh-water Mollusca of the district.

THE INTERNATIONAL PHYTO-GEOGRAPHICAL
EXCURSION OF AUGUST, 1911.

BY R. LLOYD PRAEGER.

A scientific excursion of more than ordinary interest was held during August of last year, and it seems only right that some record of at least the Irish part of it should appear in the pages of the *Irish Naturalist*. This trip was organised by the Central Committee for the Survey and Study of British Vegetation, and under their auspices a number of the leading phyto-geographers of the world were invited to spend a month in touring through the British Isles under the guidance of members of the Committee, visiting a number of places chosen as displaying characteristically the various types of vegetation found in these islands, or as being of special interest floristically. Assembling at Cambridge on August 1, three weeks were spent in England and Scotland exploring the Cambridge district, the Norfolk Broads, the Yorkshire dales, the Southport sand-dunes, the Lake District, Edinburgh, Ben Lawers, The Trossachs, and Glasgow, under the general guidance of A. G. Tansley, with local assistance from other members of the British Vegetation Committee. The party landed in Dublin on the morning of Sunday, August 20. It was made up as follows :—Professor F. E. Clements and Mrs. Clements of Minneapolis ; Professor W. C. Cowles and Mrs. Cowles of Chicago ; Professor Drude of Dresden ; Dr. Graebner of Berlin ; Dr. Lindman of Stockholm ; Professor Massart of Brussels ; Dr. Ostenfeld of Copenhagen ; Dr. Rübel and Professor Schroeter of Zurich ; G. C. Druce of Oxford ; Dr. C. B. Crampton of Edinburgh ; and A. G. Tansley of Cambridge. Professor W. E. Praeger of Kalamazoo, Michigan, joined the party for the first day ; also my wife and I, who accompanied them throughout their stay in Ireland. In the forenoon the party visited the Botanic Gardens of Trinity College, where they were received by Professor H. H. Dixon ; the afternoon was devoted to Glasnevin Gardens, where C. F. Ball did the honours in the absence from home of Sir F. W. Moore.

Next morning the 7 a.m. train was taken to Clifden. The railway company provided a saloon carriage, which facilitated a study of the country and the exchange of

views as we went along. After lunch at the Railway Hotel, a long afternoon was spent about Clifden Castle, where the first taste of the western flora, rocky hills blazing with *Dabeocia polifolia*, *Erica cinerea*, *Ulex Gallii*, &c., aroused the greatest interest. But this was surpassed on the following morning, when after a long drive through the bogs the party swept down on Craigg More Lough, with its flora of *Erica Mackaii*, Dabeocia, Eriocaulon, Lobelia, Isoetes, *Hymenophyllum tunbridgense*, *Taxus*, *Juniperus nana*, three Droseras, *Pinguicula lusitanica*, Cladium, *Saxifraga umbrosa*, and so on. We drove on to Roundstone, where after lunch we ascended Urrisbeg and studied that amazing view over sea and lake and bog. Here also we had a demonstration of the geography of the district, and some discussion on glacial problems. Thence we descended through a blaze of gorse and heather to Dog's Bay, where the famous foraminiferal sand excited much attention, and the sand flora was studied. A long drive by the coast road brought us back to Clifden. Dr. Pethybridge was with us on this day. Next morning an early start was made for Galway, where we waited till the afternoon for the steamer to Ballyvaughan. Arrived there, we drove to Glen Inagh as quickly as possible, and ascended the limestone hills, where our foreign visitors were deeply interested in the remarkable Burren flora, and time was all too short for its study. We worked on till dusk, and then drove back to Ballyvaughan, where Miss Norah Kerin had a royal feast awaiting us.

On Thursday morning we drove off early for Ardrahan, stopping at Corcomroe to explore a level stretch of limestone pavement, which yielded *Adiantum Capillus-Veneris*, and other characteristic plants. We were driven back to the cars by a torrent of rain, which was fortunately of short duration, and near Ardrahan we explored another bit of the limestone, with Dryas still dominant. After lunch at Taylor's Hotel we entrained for Killarney, the long journey being made more pleasant by the large through corridor carriage which the company kindly placed at our disposal. The cessation of work was welcome, and plants were put away, drying paper changed, and notes written up. It was late in the evening when we reached the Lake Hotel, Killarney.

Next morning the beautiful view of lake and mountain brought the party out early on the terrace, and after breakfast we drove to Derrycunihy, where the glorious native woods filled with Arbutus, Saxifrages and Hymenophyllums raised the foreign visitors to a wonderful pitch of enthusiasm. Many hours were spent here discussing the vegetation, collecting and photographing ; in the afternoon boats were waiting to row us back to Killarney. Interesting plants were seen on the way, including great beds of Pilularia in the Long Range, and an unknown pondweed. The opportunity was taken to land on one of the limestone islets and list its flora, which included Arbutus and a beautiful bright yellow form of *Orobanche Hederae*.

On Saturday an early train brought us into Cork before 10 a.m., and by 11.0 we were fraternizing with Mr. R. H. Beamish, whose splendid collection of plants is now famous. Here our visitors saw the possibilities of the Irish climate as regards the open-air cultivation of warm-temperate plants, and many of the specimens flourishing here were viewed with genuine astonishment. After Mr. and Mrs. Beamish had hospitably entertained the party, another hour was spent in the gardens ; then train was taken back to Cork and half-an-hour later the steamer left for Plymouth, where the party spent several interesting days in Cornwall before the Portsmouth meeting of the British Association.

Without doubt the International Phyto-geographical Excursion of 1911 was a great success. To our foreign visitors it supplied a comprehensive view, under skilled guidance, of the most important insular areas of western Europe. To us in the British Isles the interchange of views regarding the different vegetation-types and the factors that control them was of very high importance ; and to both foreigners and Britishers the making of new friendships and the cementing of old ones among a group of men drawn together from many lands by common scientific interests was in a high degree both pleasant and profitable. The keenness of our foreign brethren lent a new interest to every well-known vegetation-type and every ecological problem, and the railway journeys were beguiled with illuminating discussion of the many questions which confront the phytogeographer in every country.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Lesser White-nosed Monkey from Mr. H. C. de la Poer, a pair of Lions (East African), from Mr. H. C. Barclay, a male Leopard from Capt. C. Wood-Hill, three Rabbits and six Cavies from Mr. W. Costello, a young Donkey from Master L. Ferrar, a pair of Pink-footed Geese from Mr. W. Williams, a Mute Swan from Mrs. Moffett, and a West African Python from Mr. C. E. Lane Poole. The last named is more than fifteen feet in length, and the largest snake ever exhibited in the Society's Gardens. Two White-handed Gibbons have been obtained, and occupy the large central cage in the Monkey House. One of them is a very attractive and agile animal.

DUBLIN MICROSCOPICAL CLUB.

DECEMBER 13.—The Club met at Leinster House, the President, A. R. NICHOLS, M.A., in the chair.

J. N. HALBERT, M.R.I.A. exhibited a "beetle-mite" *Oribata sphagni*, Michael, found amongst moss in a stream on Croaghpatrick, Co. Mayo. The species is remarkable on account of its aquatic habit, small size, and other characters. According to the original description the pseudo-stigmatic organs are minute in this species, and completely hidden within the pseudo-stigmata. In the Croaghpatrick specimen, however, these organs are clearly visible, and of very strongly clavate structure. The only previously known locality for the species is Epping Forest, where it was discovered by Mr. A. D. Michael, who described and figured it in his "British Oribatidae."

DR. G. H. PETHYBRIDGE showed the parasitic fungus *Thielavia basicola*, Zopf, from Adare, Co. Limerick. It is known to attack the roots of a considerable number of cultivated plants, and in the present instance it was causing considerable damage to the tobacco crop. Its presence in Ireland has not hitherto been observed ; hence the present is a new record.

C. F. BALL exhibited preparations of *Utricularia prehensilis*, E. Meyer. This curious little Bladderwort is a native of tropical and south Africa, and Madagascar. It grows in very shallow water, and the strap-like green leaves, 1 to 2 inches long, float on the surface. The stems run about in the mud and from them appear climbing flower stems twining like a Runner Bean, and these produce yellow flowers. On the stem in the mud are formed bladders, which are transparent. The bladders are traps for catching small aquatic animals ; the small animals can easily push open a valve-like door to enter, but once inside cannot get out, and perish from starvation or suffocation. The products of their decomposition nourish the plant, and are taken up by special absorption cells which line the interior of the bladders. These absorption cells are rather curious ; they consist of a basal cell on which are fastened two long finger-like cells,

which may be clearly seen under the microscope. In the British species like *Utricularia neglecta*, there are four finger-cells attached to the basal cell.

Prof. G. H. CARPENTER showed the wingless males and egg-laying females of the Common Apple Aphid (*Aphis pomi*) taken in the month of November, in Co. Fermanagh.

BELFAST NATURALISTS' FIELD CLUB.

DECEMBER 19.—F. J. BIGGER gave a lecture on "The Raths of an Ancient Settlement between the Bann and the Maine rivers on the banks of Lough Neagh," to a large audience. The President (R. Welch) in the chair. A short discussion followed, in which the President, and Messrs. Dickson, Milne, and May took part. Four new members were elected.

JANUARY 3.—JUNIOR SECTION.—An address was given by Arthur Deane, curator of the Museum and Art Gallery, on forest trees. The chair was occupied by the President (R. Welch).

JANUARY 10.—ZOOLOGICAL SECTION.—A paper on "Rare Birds in the Municipal Collection," was read by J. A. Sydney Stendall. The chairman of the Section, Nevin H. Foster, occupied the chair. Some of these birds, though shot in the early part of the last century, are in perfect condition. Among the most interesting may be mentioned Sabine's Gull, the first recorded specimen for the British Isles; Bonaparte's Gull, from the River Lagan, the first British specimen; Bonaparte's Sandpiper; the Buff-breasted Sandpiper; the American Bittern, shot near Armagh in November, 1845; the first authenticated Irish specimen of the Red-backed Shrike, a bird common in many parts of England, though of very rare occurrence in Ireland; the Snowy Owl; the Black-necked Grebe, one of our rare winter visitants; the first Irish specimen of the Surf Scoter, a duck of North American origin; the Pink-footed Goose; and lastly, a beautiful specimen of the Gyr or Iceland Falcon.

N O T E S.

ZOOLOGY.

Unusual Nesting-site of the Tree Creeper.

Early in June, 1910, while staying in Connemara, my attention was drawn to the nest of a Tree Creeper (*Certhia familiaris*), built in the skin of a Common Seal, that hung on the branch of a fir tree, outside the motor garage at Kylemore Castle. The skin had been slung across the branch, about five feet from the ground, leaving both ends hanging down and touching each other. The nest was built between the two sides, there being only one entrance, as the edges of the opposite sides rested against the trunk of the tree. Owing to the fact that the skin had been allowed to dry in the sun, it hung down in a very irregular manner, and the space formed between the two sides was very uneven, being rather inclined

towards the centre of the skin, allowing the edges to nearly meet in some parts. The nest at the time was only partly lined. On reflection I think the site by no means so extraordinary, as, no doubt, the birds saw some resemblance between the dried skin and the bark of a tree.

GEO. R. HUMPHREYS.

Dublin.

Migration of small birds (Chaffinches) across the Channel.

On 12th October, 1911, at about 4 p.m. (English time), when crossing the St. George's Channel from Rosslare to Fishguard, and half an hour from the latter port, the weather being foggy and no land visible, my attention was called by a fellow passenger to a flock consisting of twenty-three finches. These were flying alongside the steamer, and on the same course. My fellow passenger first called my attention to them as Chaffinches, and I myself identified one at least as a Chaffinch. Shortly after I first saw them they seemed to become alarmed by the steamer, as they suddenly arose higher in the air and fell astern; but shortly afterwards they forged ahead again, and easily passed the steamer, flying a few feet above the water and going towards land. It seems to me that the above note may be of interest, because it gives a definite observation of a particular species on migration, and the speed may be set down, having regard to the pace of the steamer, as at least 25 knots.

G. E. H. BARRETT-HAMILTON.

Kilmarnock, Campile.

Common Sandpiper and Land-rails in Winter.

Mr. T. Hyde Moberly, of Buckmount, Crosshaven, Co. Cork, observed a Sandpiper about the shore there early in December, which remained, and he shot it on 11th January. My friend Mr. Robert Warren has seen it at the establishment of Messrs. F. R. Rohu & Sons, where it is being preserved, and he finds it to be a Common Sandpiper.

Messrs. Rohu & Sons, writing on 6th January, said:—"Have you noticed the very late appearance of the Corncrake in this country. Several specimens were sent to us as late as a week ago." In the *Field* of 30th December Mr. Godfrey Pike states that the Corncrake (which he sent to the Editor) was shot on a bog at Carrignavar, Co. Cork, on 19th December. Possibly the mildness of this singular winter is to be connected with the lingering of these summer visitors.

R. J. USSHER.

Cappagh, Co. Waterford.

GEOLOGY.

High-level Deposits of Marine Shells in Donegal.

On arriving home after a short visit to Donegal, and opening the November number of the *Irish Naturalist*, I was delighted to read the article by Mr. J. de W. Hinch, "On High-level Deposits of Marine Shells." Only the last day I spent in Donegal I had seen similar deposits and had decided in my own mind that they were due to man's intervention. On the west

side of Killybegs Harbour, opposite the Rotten Island lighthouse, is the little bay known as Roslin Port, and high up on the hillside is a small cave known as Marget Dhu's Cave. The entrance is covered with brambles and not very easy to find, and roughly speaking it is some 30 to 40 feet above the high tide mark. On entering the cave no signs of any animals were to be seen with the exception of quantities of a large spider, and numbers of cocoons of their eggs suspended from the roof ; I have handed specimens to Mr. Winter, of Bradford, and will communicate the name of the species later. The soil on the floor was undisturbed, and of a light brown colour similar to the soil outside. The place seemed a very likely one for a habitation, so it was decided to make a little further investigation and a spade was requisitioned ; on digging down it seemed that most of the soil had been washed or blown in from outside, but at a depth of some 14 to 16 inches, a layer of snells occurred, some 2 inches deep, and the soil was much darker, almost black ; the only types I noted were the whelk and the limpet, but unfortunately time was too short to make a further investigation. On some future occasion I will endeavour to clear the whole floor down to the shell level and make more careful notes. Mr. J. de W. Hinch, to whom this note has been shown, together with samples of the shells, says that there can be little doubt that this is a pre-historic kitchen-midden. Later in the evening I was speaking to Mr. P. Carre, of Roslin, and he informed me that when some excavations were being made higher up on the Drumane Road, he saw large quantities of similar shells ; this is considerably further inland and much higher above sea-level. I intend to have a look into this matter also on my next visit.

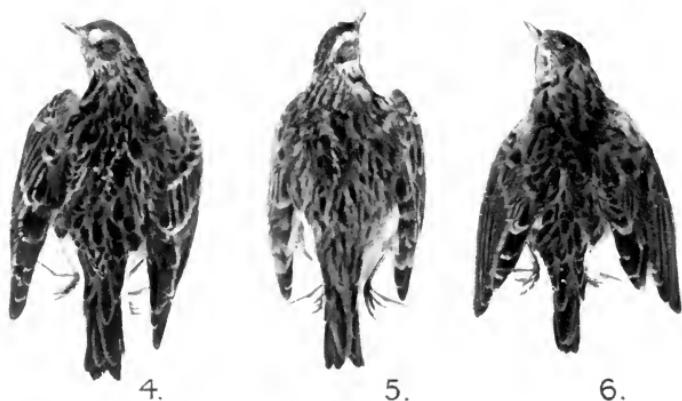
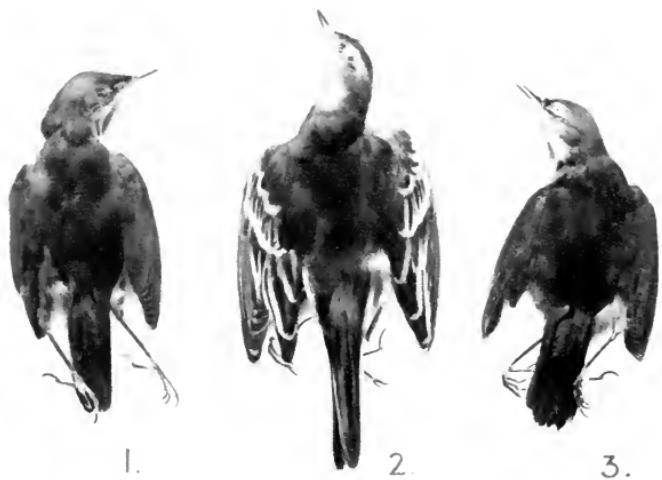
CHRIS. A. CHEETHAM

Farnley, Leeds.

Fossil Foraminifera.

The Belfast Naturalists' Field Club publish, as an Appendix to the Report and Proceedings for 1910-11, two interesting papers by their veteran member, Mr. Joseph Wright, F.G.S., the one entitled "Boulder-clays from the North of Ireland, with lists of Foraminifera," and the other, "Foraminifera from the Estuarine Clays of Magheramorne, Co. Antrim, and Limavady Station, Co. Derry."

The titles are slightly misleading, as the first paper is occupied entirely with an account of Foraminifera obtained, the clays themselves being not described in any way ; while in the second paper "Limavady Station" should read "Limavady Junction" ; there are no Estuarine clays at Limavady, which lies beyond the formerly submerged area in which is situated the junction of the main line and the Limavady branch. The lists of Foraminifera which Mr. Wright gives in these papers furnish an important contribution to the knowledge of our post-Pliocene fauna. A number of very rare species are recorded, and the following new forms are described, and illustrated in two excellent lithographed plates :—*Lagena laevigata* var. *Malcomsonii* var. nov. ; *Lagena Stewartii* sp. nov. (named after S. A. Stewart) ; *Lingulina carinata* var. *biloculi* var. nov. *Discorbina Millettii* sp. nov. ; *Biloculina haddoniana* sp. nov. (named after Professor A. C. Haddon).



1. Reed-Warbler. 2. Blue-headed Wagtail. 3. Reed-Warbler.
4. Skylark (male). 5. Mediterranean Skylark. 6. Skylark (female).

BIRDS FROM THE TUSKAR

SOME BIRDS NEW TO IRELAND.

BY PROFESSOR C. J. PATTEN, M.A., M.D., SC.D

(PLATE I.).

WHEN staying at the Tuskar Rock Lighthouse during last September and part of October, I obtained three species of birds which heretofore have not been included in the Irish list. The date of the first capture was September 12th. On a cursory examination I took the specimen to be an immature Yellow Wagtail, otherwise known as Ray's Wagtail (*Motacilla Raii*) ; however, though it may be difficult to distinguish this species from an immature Blue-headed Wagtail (*M. flava*), I am bound to say that I am strongly of opinion that my specimen belongs to the latter species. The white eye-stripe, *present at all ages*, is perhaps the best mark by which a typical example of this species can be distinguished from the Yellow Wagtail. In my specimen this feature is pronounced. Were one dealing with one of the several representative forms, (ranked even as different species by some ornithologists) of the Blue-headed Wagtail, in which the eye-stripe is absent or but ill-defined, the matter would be much more difficult to decide. In my specimen the typical white chin and throat and the very pale yellowish-white abdominal feathers follow the plumage of the Blue-headed, rather than that of the Yellow Wagtail. Moreover, my specimen displays the yellowish-white tips on both the greater and lesser wing-coverts, producing thereby the double wing-bar, as well as another important plumage-marking, namely, a fairly broad black band on the inner web of the two outer rectrices of either side, the remaining portion of these feathers being white. In the corresponding feathers of the Yellow Wagtail the white is merely edged with black on the inner webs. Many other details in the plumage, unnecessary to mention here, afford evidence that the specimen in question is a Blue-headed Wagtail. Provisionally then, I propose to designate it as such, hoping at the same time to

subject it to further critical examination, and report again on it.¹

The second species whose occurrence I wish to record is the Reed-Warbler (*Acrocephalus streperus*). On September 19th I obtained two of these birds out of a party of five. While we have been supplied with hearsay evidence of the occurrence of this warbler in Ireland, I cannot find a record of the existence of any Irish specimen other than the two now secured on the Tuskar.

The third species I obtained on October 5th. It is a lark, which from comparison answers to the description of *Alauda cantarella*, the Mediterranean Skylark. Indeed, when the bird was undergoing critical examination at the British Museum on October 17th last, Mr. Ogilvie-Grant seemed quite definite in his opinion that the bird in question is *Alauda cantarella*. While the pattern of the plumage bears a close resemblance to that of our Common Skylark (*Alauda arvensis*), the shade is quite different. In *A. cantarella* it is ashy grey, and presents somewhat the same relation to the rich rufous shading of the Skylark's plumage as does the winter plumage of a Dunlin or of a Ruff to the autumn garb of these respective birds. But in the shorter and more slender beak, with a stronger upward curvature of the lower segment, the hindermost end or angle of the gonys being more projecting; in the conspicuous white eye-stripe; and in the dark ear-coverts circumscribed below and behind by a definite light band, *A. cantarella* is at once distinguishable from *A. arvensis*.

It is necessary to state that in contributing these brief but important notes to the pages of the *Irish Naturalist* for the benefit of Irish ornithologists, I desire it to be understood that my work carried out on the Tuskar Rock last autumn forms only the beginning of a comprehensive task which I have embarked upon in connection with the study of bird-migration at Irish Lighthouses. Aided by a

¹ In his 'Migration of Birds,' p. 99, Analysis of Reports, 1881, 1897, Mr. Barrington records the occurrence from the Tuskar of an immature Ray's Wagtail in that state when it is difficult to tell it from the Blue-headed Wagtail. I certainly think that the plumage of this doubtful specimen should be carefully described.

Government grant for research, administered by the Royal Society, which aid, here and elsewhere in my publications on the subject, it is indeed a pleasure to acknowledge. I hope to continue my researches for several seasons, and it is a great pleasure to have made such a fruitful beginning.

To the Commissioners of Irish Lights I am deeply grateful for permitting me to reside at the Tuskar Lighthouse, while the kind hospitality shown by the Head Lightkeeper and his staff, and their readiness to grant me all facilities when engaged in my researches, claim indeed my cordial thanks.

In regard to the specimens dealt with in this paper my best thanks are due to my fellow-workers in Irish ornithology, Mr. Ussher and Mr. Barrington, also to Mr. Ogilvie-Grant and Dr. Hartert for the careful way in which they examined and compared the skins when I took the latter to the British Museum on October 17th last. The identification of the Reed-Warblers as such is established beyond the vestige of a doubt. For the present I take the sole responsibility of naming the Lark and Wagtail provisionally. Both these birds will again be examined, compared, and reported upon in the near future.

EXPLANATION OF PLATE I.

In the upper row the Blue-headed Wagtail (No. 2), is placed between the two Reed-Warblers (No. 1 and No. 3).

In the lower row the Mediterranean Skylark (No. 5), is placed for comparison between a male Skylark on the left (No. 4), and a female Skylark on the right (No. 6).

N.B.—The bodies of the Reed-Warblers are preserved, but have not yet been dissected. The sex of the Wagtail and of the Lark is male. A minute histological examination of the sex-organs of all three species will be made with a view of arriving at the question regarding maturity, plumage-markings alone being not altogether a reliable test.

LUMINOUS OWLS.

SUPPLEMENTARY NOTE.¹

BY PASTOR C. LINDNER.

WHILE turning over, the other day, the leaves of the *Journal für Ornithologie* (the most important ornithological magazine in Germany), I found in vol. xiii. (1865, pp. 419-420) the description of an observation which, I think, may supplement the article published by Miss E. Dobbs in last year's *Irish Naturalist*.² In that volume of the *Journal für Ornithologie* the late Dr. C. Bolle translated the Catalogue of the Birds of Sardinia, by T. Salvadori, where we read about the Mediterranean Cormorant (*Phalacrocorax Desmaresti*, Payr.), as follows:—

“ The Marchese Antinori and I have made a very remarkable observation on the feathers of this Cormorant. I had killed a young one near St. Elias' Head, and put it into the boat, which was white-washed and coloured green with oil paint. On skinning the bird we perceived that the feathers of the upper side, chiefly of the back, the shoulders, and the tail seemed to be soiled by the green paint of the boat. But though we washed the skin repeatedly with spirit of turpentine and with soap and water, we were unsuccessful in removing the colour. Indeed, when water was employed the green colour became brighter, and finally we perceived that the colour was caused, not by any artificial substance, but by an alga attached to the feathers. We found the same thing, more or less developed, on all the other young individuals that we examined. I sent some feathers to the famous botanist, Professor Pietro Savi, of Pisa, for examination, who writes:—

“ ‘ The alga which dyes green the tips of the feathers of *Phalacrocorax Desmaresti*, and which is to be found only

¹ See *Irish Naturalist*, vol. xx., 1911, pp. 177-8.

² *Ib.*, pp. 123-6.

on those which are not always immersed, belongs undoubtedly to the Chlorosperma and to the order Ulvaceae. Under the microscope it is recognised as consisting of colourless thallus or phycoma, which is transparent, compact, and sharply defined. It is composed of cellular tissue, the interior substance of which consists of cells full of endochrome-green; they are small, angular, often standing together in fours and lodged in different strata of unequal depth. This phycoma hangs by simple aggregation on the surface of the vanes of the quills, which it overspreads without any change being evident. And just as Ulvae grow on other algae, from which they probably do not suck food, but in which they, as pseudo-parasites, find conditions for local fixation, so the present Ulva is attached, as a pseudo-parasite, to those feathers which are exposed to the air and sea water by turns. If the Ulva should be new, I propose the name *involvens* for it.'

"Confirming this statement, I can add that I have never seen this alga on the feathers of the under surface of the body, but always above, and especially on the tail-quills, on the pinions, and on the shoulders. It is attached only to the edge of some feathers, while the middle part, covered by the overlying feather, is free. I have also observed this alga exclusively on young birds, and I have never seen it on the feathers of adults."

Being convinced that the remarks made about the "luminous owls" are not at all due to an illusion, but to a reality, I think that the appearance may probably be caused by a local micro-organism. Therefore, I propose to continue my observations with regard to "luminous owls" on these lines.

Wettenburg, Saxony.

NOTES FROM THE WEST COAST.

BY A. R. SANDERSON AND C. A. CHEETHAM.

LAST year three visits were paid to the west, the first being at Easter to Killybegs, County Donegal, where we were somewhat surprised to see Honeysuckle and *Vicia sylvatica* in bud. The same plants of *Vicia sylvatica* were still flowering when we again visited the district late in August. The most noteworthy point of the Easter visit was the exceedingly fine show of Furze and Primroses. During our second visit to this district we were delighted to see *Sisyrinchium angustifolium* in a third station about two miles from Killybegs ; this station, as the two former, was a meadow immediately adjoining the shore. It seems rather curious that we should find this plant in three stations in Donegal invariably near the shore, for, although always on the lookout for it further inland, so far we have failed to locate it. Some work was done amongst the mosses, and C. A. Cheetham reports the following species from this district as additions to the 1907 Census Catalogue of British Mosses :

<i>Fissidens bryoides</i> , <i>Hedw.</i>	<i>Thuidium delicatulum</i> , <i>Mitt.</i>
„ <i>decipiens</i> , <i>De Not.</i>	<i>Camptothecium lutescens</i> ,
<i>Tortula muralis</i> , <i>Hedw.</i>	<i>B. and S.</i>
<i>Splachnum ampullaceum</i> , <i>L.</i>	<i>Eurynchium praelongum</i> ,
<i>Funaria ericitorum</i> , <i>Dixon.</i>	<i>Hobk.</i>
„ <i>hygrometrica</i> , <i>Sibth.</i>	<i>Amblystegium varians</i> , <i>Lindb.</i>
<i>Webera nutans</i> , <i>Hedw.</i>	<i>Hypnum scorpioides</i> , <i>L.</i>
<i>Bryum cæspiticeum</i> , <i>L.</i>	<i>Hylocomium brevirostre</i> ,
„ <i>argenteum</i> , <i>L.</i>	<i>B. and S.</i>
<i>Mnium affine</i> , <i>var. elatum</i> ,	
„ <i>B. and S.</i>	

The following hydroid zoophytes are in addition to those mentioned in our list for 1910 (*Irish Nat.*, April, 1910) :—

<i>Eudendrium insigne.</i>	<i>Tubularia coronata.</i>
<i>Tubularia indivisa.</i>	<i>Plumularia setacea.</i>
„ <i>larynx.</i>	<i>Coryne vaginata.</i>

In connection with these, I may say that on several of the very warm days in August, the medusiform gonozoids of these animals were present in such abundance close inshore, as to give quite a distinct appearance to that part of the sea. This was particularly noticeable off Drumaneo and again near Muckross, in each place being attended by shoals of small fish, locally known as “biern.”

Whit week was spent near Roundstone (Dog’s Bay) where we were rewarded by seeing a few plants of *Erica mediterranea* in full flower. Most of the flowering plants peculiar to the district were seen, including, on the road-side, a few specimens of *Neotinea intacta*, just fruiting.

The following mosses are additions, for this district, to the 1907 Census Catalogue of British Mosses :—

<i>Polytrichum juniperinum</i> , <i>Willd.</i>	<i>Aulacomnium palustre</i> , <i>Schwæg.</i>
<i>Rhacomitrium lanuginosum</i> , <i>Brid.</i>	<i>Breutelia arcuata</i> , <i>Schp.</i>
<i>Hedwigia ciliata</i> , <i>Ehrh.</i>	<i>Bryum argenteum</i> , <i>L.</i>
<i>Tortula ruraliformis</i> , <i>Dixon.</i>	<i>Mnium hornum</i> , <i>L.</i>
<i>Weissia rupestris</i> , <i>C. M.</i>	<i>Pterygophyllum lucens</i> , <i>Brid.</i>
<i>Splachnum ampullaceum</i> , <i>L.</i>	<i>Hylocomium splendens</i> , <i>B.</i>
<i>Funaria Templetoni</i> , <i>Sm.</i>	<i>and S.</i>

The lepidoptera of this district attracted our attention, several species of not very common occurrence being seen one in particular, *Melanippe hastata*, being especially abundant amongst the bushes round the bog pools. The following were kindly identified for us by Mr. J. W. Carter, F.E.S., Bradford :—

Lycaena minima, *Macroglossa bombyliformis*, *Nemophilà russula*, *Saturnia pavonia* (cocoons), *Euclidia glyphica*, *Ematurga atomaria*, *Melanippe hastata*.

On the sand-hills we noticed the nests of Terns and Ringed Plover, one of the former containing four eggs.

In Gorteen Bay, a specimen of the interesting coelenterate, *Velella vulgaris*, was taken.

REVIEW.

MICROSCOPY FOR STUDENTS

Modern Microscopy : A handbook for beginners and students. By M. J. CROSS and MARTIN J. COLE. With chapters on special subjects by various writers. Fourth edition. Pp. i.-xvii. and 1-325. London : Balliere, Tindall & Cox, 1912. Price, 6s. net.

It has been said that "nobody can learn to play the piano by reading a book," and it may be accepted as a truism that no one can learn to work with the microscope by pursuing a similar method of study. Yet in neither of these fields of activity is "book knowledge" to be despised. This book is an attempt to give the uninitiated help in overcoming the many difficulties that beset the path of the beginner. That it fulfils its function admirably is testified to by the appearance of this the fourth edition. The book is comprised of an introduction and three parts. The first part is devoted to the microscope itself, its various parts and accessories. In this part also such subjects as dry and immersion lenses are dealt with, illumination and illuminating apparatus, choice of objectives, and similar subjects. If this part of the book is read and understood, there ought to be no difficulty in the worker getting the best work out of his instrument of which it is capable. Dark ground illumination is also clearly explained, a method which has been greatly extended in recent years. The hints on the care and use of the microscope and choice of an outfit are exceedingly good and very practical.

In Part II. are directions for the preparation of objects for the microscope, both animal and vegetable, cutting and grinding hard tissues, such as bone, rock sections, metal sections, etc., as well as instructions for finishing off slides, and for making dry mounts of various objects.

Part III. deals with various subjects, each of which will appeal to some special worker, e.g., the petrological microscope, Rotifera, Foraminifera, microscopy of foods, etc.

From the above summary it will be seen that the book covers a wide range, although it is of a handy size. We think that Flemming's method for staining karyokinetic nuclei is not so good as the iron haematoxylin method of Heidenhain, inasmuch as the former is uncertain and the latter reliable. However, a student who has arrived at this stage will be able to judge for himself. But for the legend underneath, we think it would be difficult to recognise Fig. 65 as a representation of the Cambridge rocker.

The book is undoubtedly a good one, and if its instructions are followed a good and solid foundation in the art of microscopy will have been laid. In addition to the beginner we think that there are many who are no longer beginners who would derive much advantage from becoming acquainted with its contents.

J. A. C.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

JANUARY 31.—ANNUAL MEETING, Sir C. BALL (President) in the chair. The Secretary (Prof. G. H. Carpenter) submitted and proposed the Report, which included the following statement :—

The amount of the gate receipts for the year 1911 was £2,393, £146 more than for 1910, exceeding the amount for any year since 1907. In the acquisition of new Members the Council has also to record an increase as compared with last year, but as a relatively small proportion of these have joined as Life Members the amount of subscriptions received shows some falling off. The Council hope that during 1912 the number of Members, both annual and life, will be largely increased. Such increase will enable the Council not only to maintain the Gardens efficiently, but also to improve the buildings and collections. Further, as Members and their families naturally enter the Gardens frequently, they derive more benefit, through constant study of the animals, than do casual visitors, and thus spread interest in, and knowledge of, natural history.

The financial position of the Society has been rendered most satisfactory for the present at least, through Viscount Iveagh's generous gift of £500. The Council feel deeply grateful for this much valued help. A legacy of £100 has also been received under the will of the late Mr. L. O. Hutton, for many years an active member of the Council. The year was begun with a balance of only £24, and closed with over £900 on deposit. Much of this is, however, hypothecated for work in progress.

An important change has taken place in the staff. Captain L. C. Arbuthnot, who has held the post of Superintendent for four years, resigned in July and left in October. In accepting his resignation, the Council expressed admiration for his great energy and zeal on behalf of the animals under his care. The Council decided not to advertise the vacancy, but to appoint a small Committee who might make enquiries as to suitable candidates. As a result, five or six well-qualified men offered their services, and from these Dr. B. B. Ferrar, of Armagh, was unanimously chosen. Dr. Ferrar took up his duties on November 1st, and under his direction continued, and even increased, efficiency in management is confidently hoped for.

In the last Report it was recorded that a site between the Superintendent's House and the Lion House had been chosen for the much needed Hospital and Isolation pens. It was feared that no start with this work could have been made during 1911, but Viscount Iveagh's generous gift of £500 empowered the Council to accept a contract for the building in August, and we are able to start the New Year with the long-desired hospital complete and ready for use. In the neighbourhood of the hospital a small mess-room for the Keepers, and a kitchen where food, both for them and for the animals, can be cooked and prepared, have been built opening on the yard.

During the summer negotiations were opened by the President with the Irish Fisheries Office and with the Board of Conservators and the riparian owners of the River Liffey, with a view to the establishment of a Salmon and Trout hatchery in the Zoological Gardens. The Fisheries' officers have promised to provide a supply of ova and a set of hatchery tanks, and to contribute a substantial sum towards the erection of the necessary building and the excavation of two ponds for the reception of the young fish. Promise of financial support has also been received from the Conservators and the riparian owners, so that the Council have felt justified in accepting a contract, and have put the work in hand. A further instalment of the cost will be met by the allocation of the legacy (£100) bequeathed to the Society by the late Mr. L. O. Hutton.

The cages in the apse of the Roberts House, mentioned in the Report for 1910, were completed early in the year, and afford excellent accommodation for two Caracals. A new house for the small Carnivora that are now unsatisfactorily lodged in the Monkey House is very badly wanted, and the erection of such a house will be undertaken if funds permit. The Council is also desirous of providing some open-air cages in connection with the Monkey House.

A large number of animals have been presented to the Society during 1911. From the King we have received, besides two Lions, some animals from the special African collection given to His Majesty, and exhibited through the summer in the Zoological Gardens, London.

Many other donors have also contributed valuable specimens to the collection. Mr. G. M. Jones gave a Vervet Monkey and a Yellow Baboon. Specially noteworthy were the Slow Loris given in April by Mr. C. B. Rogers and in May by Dr. Leeper; unfortunately, these interesting lemuroids did not survive through the year. The President has given a Canadian Lynx, and several Members of the Council contributed for a young Bactrian Camel which will serve, it is hoped, as a riding animal during the summer months. Sir P. C. Smyly brought from West Africa a Civet Cat and a Royal Python. M. J. N. Lentaigne gave a White-tailed Eagle, and Captain Kelsall sent from Gibraltar some Griffon Vultures.

The most important of our purchases have been made to fill gaps in the Monkey House. In May, Dr. Scharff, when in London, secured a young female Orang-utan, which has improved wonderfully under Keeper Supple's care, and is growing into a fine healthy animal. "Ginger" or "Bella," as she is called, spent many summer days in the open air, climbing trees in the grounds and building nests for herself among the branches. In December the Council accepted the offer of a male White-handed Gibbon, so that three types of Anthropoid Apes are now represented in the collection. Six Squirrel Monkeys were bought in February, four of these died very soon, but two survived until September. Other noteworthy purchases were Sooty Mangabeys and Brown and Weeper Capuchins. The large open-air monkey cage was replenished by the purchase of two dozen young Rhesus Monkeys in June.

Our splendid collection of Lions—the most famous feature in our Gardens—has been enriched by two males, deposited by His Majesty the King. One of these, a small specimen from Abyssinia, arrived in April accompanied

by its Somali keeper. The other, a remarkably large and fierce Lion from British East Africa, came to Dublin in September. Only one litter of Lion cubs were born during the year, in September, but this comprised the exceptional number of five cubs, a male and four females. Niger and Nigeria, the late King's West African pair, were the parents. Four Lions were exported during the year, all to Australia, a Lioness having been sent to Adelaide, a Lion and a pair of cubs to Melbourne. The number in the house at the close of the year was twenty-two, ten males and twelve females.

Besides the litter of five Lion-cubs already recorded, the birth of two Puma-cubs in November has made a welcome addition to our stock of large Felidae; the Pumas are reared and housed in the open-air dens at some distance from our Lion House. A Black-headed Lemur, born in April, was reared, and is doing well. In June, three Prairie Marmots, and in July three Egyptian Gerbilles were born; these have likewise been reared successfully. The birth of a Black-tailed Kangaroo in May is also noteworthy. Among the birds the breeding of Rheas was successfully resumed. None had been hatched during 1910, but nine were safely brought out by the nursing male in July, 1911. Seven of these unfortunately died soon after being hatched, but the surviving two are healthy and likely to thrive. The flock of Rheas roaming freely about the Gardens certainly form a very attractive feature in our collection.

The number of deaths has been less than in some other years. Our most serious loss was the female Chimpanzee "Jennie," who had lived in the Ape House for over six years; she died in November. The male Gibbon also died in the summer. Few animals that we ever kept in the Monkey House have been greater favourites with visitors than the three Gibbons that occupied the large central cage for the greater part of 1909, and the death of their last survivor caused a lamented gap, which has now, however, been filled. Another well-known denizen of the Monkey House, whose loss we deplore is the White-collared Mangabey, which died in November, apparently of old age. A Black Ape and other monkeys succumbed to tuberculous disease.

On the recommendation of the Council's Photographic Committee, the Society's Silver Medal, for the best set of pictures submitted, has been awarded to Mr. S. Amphlet, of Walsall; Miss L. Spence, Clonelly, Fermanagh, being highly commended. The Bronze Medal offered to competitors under eighteen years of age, has been won by Miss Ethel Goodman, Dublin.

The practice of organising popular lectures has been continued, and the Council was so fortunate as to obtain the help of Mr. R. J. Ussher, D.L., M.R.I.A., who addressed a large and appreciative audience in the Royal Dublin Society's Theatre on "Birds and their Breeding Habits." The Council's hearty thanks are due to Mr. Ussher for this lecture, and also to the Council of the Royal Dublin Society for the use of the Lecture Theatre on that occasion as well as for our annual meeting.

The adoption of the Report was seconded by Sir NEVILLE LYTTLETON and carried. A change in the rule regarding the election of honorary Vice-Presidents—twenty years on the Council instead of twenty-five to qualify in future was agreed to. Prof. J. Bayley Butler, Sir John Ross of Bladensburg, and Col. Claude Cane were chosen to fill vacancies on the Council,

Prof. J. A. SCOTT gave an interesting account, illustrated by an excellent series of lantern slides of events in the Gardens during 1911.

Recent gifts include :—a Rhesus Monkey from Mr. Quinton ; a Badger from Mr. M. Suiton, eight Cavies from Mrs. Webber, a Goshawk from Dr. Tate, a Javen Parrakeet from Mrs. Humphreys, three Grass Parrakeets from Mrs. Trevor, Sulphur-crested Cockatoos from Rev. E. D. Crowe, and Miss Beasley ; a Tawney Owl and a Wigeon from Mr. H. B. Rathborne, and four Bullfinches from Rev. W. F. Johnstone. A Blue and Yellow Macaw has been received on deposit, and a pair of Black-necked Swans acquired by purchase.

BELFAST NATURALISTS' FIELD CLUB.

JANUARY 16.—The President (Robert J. Welch) occupied the chair. Rev. W. P. Carmody read a paper by himself and A. G. Wilson on "Kitchen Middens in Dingle Bay." Mr. Carmody, after a brief description of the range of sand-dunes in Dingle Bay known as The Inch, proceeded to describe the extensive middens which the authors discovered on these sand-hills.

J. A. S. STENDALL read a paper on Nature Study. After a brief description of what Nature Study really is, the lecturer referred to the way schools in England have taken the matter up and to the fact that it bid fair to become universal in Belfast, and at no distant date. Among those who took part in the debate were the President, Mrs. Hobson, and W. J. C. Tomlinson, H. L. Orr, J. M. Dickson, Robert Patterson, and R. H. Whitehouse.

JANUARY 24.—GEOLOGICAL SECTION.—A paper was read by James Orr on "Local Fossils and their Correlation with Recent Types." There was a large attendance of members; the Chairman of the section (W. J. C. Tomlinson) presided. After his paper, Mr. Orr gave a practical lesson on the subject by means of a collection of fossils which he had obtained from our local fossiliferous rocks. With every conspicuous type of fossil form he had a specimen of its nearest living representative.

A short discussion followed, in which Dr. Dwerryhouse, W. A. Green, G. Donaldson, and the Chairman took part.

DUBLIN NATURALISTS' FIELD CLUB.

NOVEMBER 21.—W. F. GUNN (Vice-President) in the chair.

R. Ll. PRAEGER opened a discussion on Mr. Clement Reid's paper : "The Relation of the Present Plant Population of the British Isles to the Glacial Period" (*supra*, p. 201). After giving a summary of the paper, Mr. Praeger criticised certain of Mr. Reid's conclusions, the essential point of which was that the whole of the fauna and flora of the British Islands, with the exception of a few alpine plants, had been introduced by chance dispersal, since the glacial period. The following members also took part in the discussion :—Professor Carpenter, Messrs. N. Colgan, W. F. Gunn, T. Hallissy, C. B. Moffat, R. Southern, and W. B. Wright. In the course of the discussion it was pointed out that Mr. Reid had used only botanical evidence and had ignored the fauna altogether, though distribution of the

latter presented greater difficulties than that of the flora. It was also shown that the geological evidence would lend more support to a different solution of the problem. The theory which gained most support may be thus briefly stated : During the glacial period the land stood higher than it does now, and a large portion of the present Irish fauna and flora survived on an ice-free area, lying to the south of Ireland. Following the retreating ice, this fauna and flora would advance and occupy the south-and south-west parts of Ireland and England, where so many peculiar types are now found. The evidence in support of this theory was discussed at some length.

Miss Adelaide Sharpe and C. M. Selbie were elected members of the club.

DECEMBER 12.—Professor G. A. J. COLE, M.R.I.A., F.G.S., in the chair. The Secretary read out the list of nominations of Officers and Committee of the Club for 1912.

The programme of the evening consisted of a number of exhibits and demonstrations, as follows :—

R. SOUTHERN showed the three Irish species of Lug-worms (*Arenicola marina*, *A. Grubei*, and *A. ecaudata*), together with post-larval stages of each of them. Their distinctive characteristics, habits and life-histories were discussed, and maps showing their distribution exhibited.

W. B. WRIGHT showed an electroscope for determining rapidly the radium content of rocks and minerals. He explained its mechanism and method of use. He also showed a specimen of hornblende rock from Colonsay, with included and partly absorbed quartzite, felspar resulting from the interaction. Also limestone from Alnö, Gulf of Bothnia, melted by syenite and recrystallised.

J. N. HALBERT showed specimens of the Ash-bark beetle, *Hylesinus crenatus*, found in the bark of Ash trees near Blanchardstown, Co. Dublin. The trees were dead, and he was of the opinion that they had probably been killed by the beetles. This is only the second recorded instance of the occurrence of this injurious insect in Ireland.

T. HALLISSY showed some new fossils from Bray Head, associated with Oldhamia. They were first found by Father Ryan, S.J. Their resemblance to certain fossils from the Cambrian beds of Canada, recently described by Walcott as Holothurians, was pointed out.

A. WILLIAMS showed pearls from the Fresh-water Mussel, found near Strabane.

C. M. SELBIE showed an unusually large specimen of the Common Lobster, taken in the Irish Sea. It measured twenty-one inches from the tip of the snout to the end of the tail.

C. ARMSTRONG showed the fibula of a Brown Bear, worked into an implement, recently found in cairns of Bronze age, on Carrowkeel Mountain, Co. Sligo. This is the second instance of the association of the bear with early man in Ireland, and supplies more valuable evidence than the tooth previously known.

G. O. SHERRARD showed stems of the Common Woodbine which had twisted round each other.

R. LI. PRAEGER drew attention to an interesting fact observed during the examination of the above-mentioned cists on Carrowkeel Mountain. The growth of the peat up the sides of one cist, and its absence beneath the cists, indicate that the peat is of more recent growth than the age of the cists (about 3,000 years).

JANUARY 9, 1912.—ANNUAL GENERAL MEETING.—W. F. GUNN in the chair. The Hon. Secretary (R. SOUTHERN) read the Annual Report of the Committee for 1911, after which the Hon. Treasurer (H. G. CUTHBET) presented his Annual Report and Balance Sheet. These reports showed that the Club had had a successful year. The meetings had been well attended, and the finances of the Club were in a more satisfactory condition than they were last year. On the motion of R. LI. Praeger, seconded by W. B. Moffat, the Reports were adopted. The Officers and Committee of the club for 1912 were then elected, as follows:—President, W. F. Gunn; Vice-President, N. Colgan; Hon. Treasurer, H. Gore Cuthbert; Hon. Secretaries, R Southern and T. Hallissy. To fill vacancies on the Committee: D. L. Murphy, G. O. Sherrard, and W. B. Wright.

W. B. WRIGHT, B.A., F.G.S, then gave a lecture on "Some Recent Additions to our Knowledge of the Geological History of Man." The lecturer gave a brief account of the latest classification of Palaeolithic deposits, and pointed out how recent discoveries have led to the important conclusion that Europe was occupied by no less than three distinct races of man, in the Palaeolithic period. Casts of the skulls of these men, kindly lent by Dr. Scharff of the Irish National Museum, were exhibited and compared with those of the nearest living races and with Dubois' *Pithecanthropus erectus* from Java. Certain discoveries of Osmund Fisher and Clement Reid, which prove the presence of man in Great Britain in pre-glacial times, were then described, and the lecture, which was illustrated with lantern slides, concluded with an account of the recent discovery of implements in the Pliocene Crag of Norfolk. At the conclusion of the lecture, W. F. Gunn exhibited seeds of *Erodium gruinum*, and demonstrated the action of the hygroscopic attachment in helping to bury the seeds.

Dr. G. B. Crawford and Victor E. Stephens were elected members of the club.

ASSOCIATION OF ECONOMIC BIOLOGISTS.

The yearly gathering of this Society has been arranged for Thursday and Friday, March 28th and 29th, at the Royal College of Science, Dublin, (by permission of the Department of Agriculture and Technical Instruction,) under the Presidency of Professor G. H. Carpenter. The presence and support of Irish biologists is invited. Dr. G. H. Pethybridge is acting as local Secretary.

N O T E S .

ZOOLOGY.

The Twaite Shad in Killarney Lakes.

Mr. John Hilliard has sent me a Twaite Shad (*Clupea fintia*) from Killarney ; the fish is nine inches long and was captured on January 31st, when it was found gasping on top of the water. Mr. Hilliard writes me that he has found several Shad washed ashore and it seems probable that some of the Twaite Shad that enter Killarney in May do not return to the sea during the summer, but pass the winter in the lakes. Mr. Hilliard reminds me that the Killarney Lakes are only five miles from the tidal waters of the Laune, and is not satisfied that Shad winter in the lakes. But this seems a more probable explanation than that they run up from the sea in the winter, for it is known that Shad, like other anadromous fish, such as Salmon and Smelt, may form non-migratory lacustrine colonies under favourable conditions, and in the large lakes of northern Italy the permanently freshwater Shad have become specifically distinct from their migratory relatives. I am not acquainted with any other case of Shad wintering in fresh water in the British Isles. The specimen also has the interest that the man who caught it mistook it for a Pollan, thus confirming a suspicion I have entertained for some time, that the so-called Pollan of Killarney is the Twaite Shad. In 1852 a Mr. Ffennell exhibited to the Dublin Natural History Society, Pollan from Lough Neagh and from Killarney, and pointed out differences in the shape of the head and the gill-covers ; the presumption that the so-called Pollan of Killarney were Twaite Shad is strengthened by the facts that they were captured in May, and that the Pollan of the Shannon and of Lough Erne do not differ from those of Lough Neagh in the shape of the head and opercles.

C. TATE REGAN.

British Museum (Natural History).

Little Auks in Co. Dublin.

Two specimens of the Little Auk (*Mergulus aile*), an irregular winter visitor to Ireland, usually after stormy weather, were found alive in County Dublin during the first week of February of this year. The birds were quite tame, but unfortunately refused to take any food and only lived for a short time. One was found at Portmarnock by Miss Browne-Clayton and the other at Rathfarnham by Miss Wize.

A large visitation of the Little Auk to the British Islands would seem to have occurred at the beginning of February. Mr. W. Williams informs me that he has specimens from different parts of Ireland, and several notes have appeared in *The Field* and other English newspapers of captures of this bird in England.

Mr. Ussher in "The Birds of Ireland." says that this bird has usually been obtained in Ireland during the months of November, December, and January, and refers to the absence of records for February.

A. R. NICHOLS.

National Library, Dublin.

Black-tailed Godwit at Lough Swilly.

On 23rd January, Mr. John McConnell shot a Black-tailed Godwit (*Limosa belgica*, J. F. Gmelin) at Inch, Lough Swilly. January is an unusual time for the species to visit us. Previous records have been in late autumn or spring.

D. C. CAMPBELL.

Londonderry.

BOTANY.***Juncus acutus*, Linn., in Co. Kilkenny.**

While travelling in the Rosslare express on March 18th, 1910, I caught sight, from the carriage window, of a large tussock of *Juncus acutus* on the river-bank as the train neared Waterford City, but knowing that mistakes have frequently been made through identifying plants from trains and cars, I waited for an opportunity of examining the specimens at close quarters before making any record. Accordingly, being in Waterford on January 14th of this year, I walked along the railway, which here runs alongside the River Suir, and at about two miles below the station, on a rocky point, I found about a dozen large and luxuriant clumps of this handsome rush in full fruit, growing in the thick tough clay which here and there overlies the rocks at that place. The presence of this species so far from the coast is remarkable, all its other known Irish habitats being sandy warrens and marshes by the seaside.

R. A. PHILLIPS.

Cork.

***Arbutus Unedo*.**

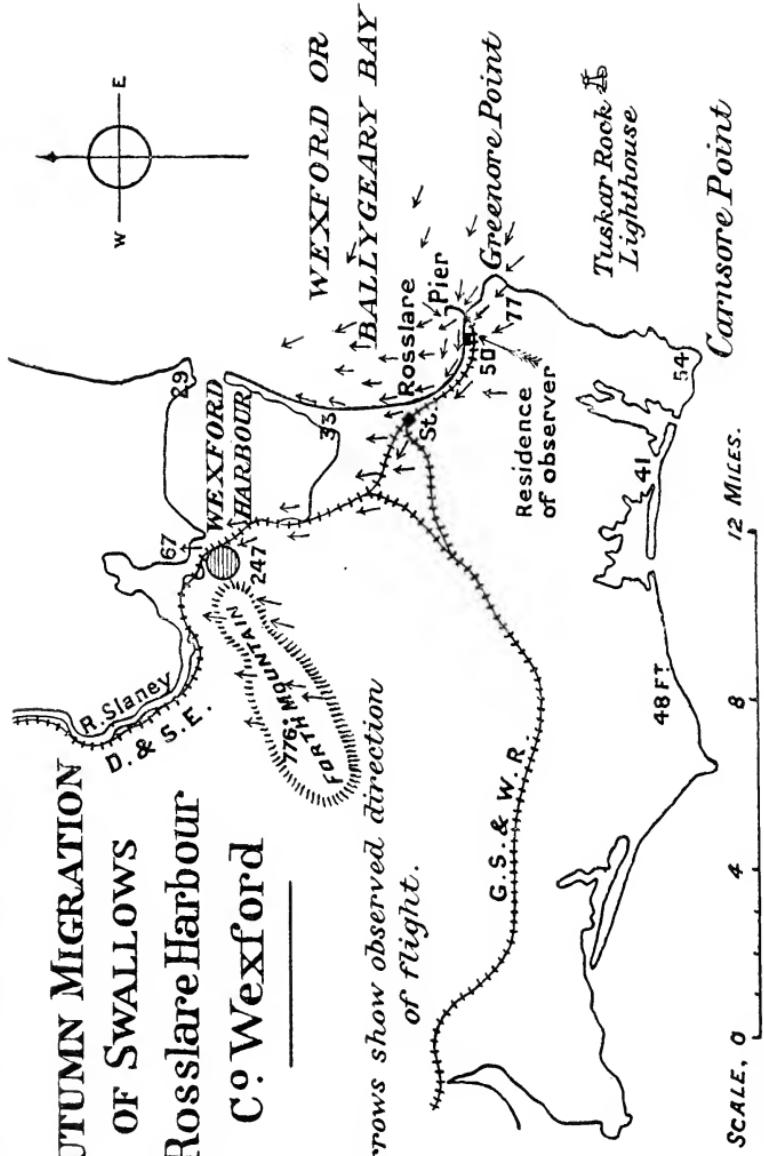
A very interesting extension to the known continental range of this tree is given in Elwes and Henry's "Trees of Great Britain and Ireland." In Vol. III. of that very comprehensive work, under *Arbutus Unedo*, p. 559, the authors quote from the *Bull. Soc. Bot. France*, xliii., p. 123 (1896), as follows: . . . "very abundant in company with Oak and Mountain Ash, in a wood 1½ miles in length, on the abrupt and rocky slope of the cliff of Trieux, near Paimpol in Côtes du Nord (Dr. Avicé)." On the face of the record, there appears to be no reason to question the nativity of the Arbutus in this locality, which forms a most satisfactory link between its stations in south-west Ireland and those on the west coast of France. Previous to this new record by Dr. Avicé, the most northerly station known on the continent was near La Rochelle in Charante Inférieure in about 46° lat.; as Paimpol in Brittany lies in 48° 50' lat., the gap between its French and Irish stations is reduced practically by one-half.

R. W. SCULLY.

Dublin.

AUTUMN MIGRATION OF SWALLOWS Rosslare Harbour Co. Wexford

*Arrows show observed direction
of flight.*



To face page 65.

THE AUTUMN MIGRATION OF SWALLOWS AT
ROSSLARE HARBOUR.

BY ALFRED D. DELAP, M.INST.C.E.

[PLATE 2.]

ROSSLARE HARBOUR is on the east coast of Co. Wexford, 6 miles north of Carnsore Point, the extreme south-eastern corner of Ireland. A glance at the map (Plate 2) will show that the coast-line here runs nearly east and west. Tuskar Rock and lighthouse lie $6\frac{1}{2}$ miles south-east of the harbour. The mountain of Forth is a low ridge extending from the town of Wexford about 5 miles in a south-by-westerly direction. The point where the following observations were made, except when otherwise stated, was the top of the clay bank or cliff immediately opposite and south of Rosslare Harbour.

For the past ten years the writer has noticed, during the autumn, large numbers of Swallows passing along the coast in a westerly or north-westerly direction, and at first it was thought that these were birds that had bred further west, that they had travelled along the south coast and were still following the coast-line to reach some point of departure from Ireland, possibly a little to the north of this, and that it was only the accident of the coast-line trending nearly due west that determined the unusual and unexpected direction of their flight at this point. This idea was rather strengthened by noticing that numbers of birds, especially in calm or fine weather, instead of closely following the coast-line, turned north as if to take a short cut across Wexford Bay and pick up the coast some miles further on.

This flight of birds is usually in the form of a thin stream, often lasting for several hours without a break, with seldom more than a dozen birds in sight at any time; they are travelling low and moderately fast, taking advantage on windy days of the shelter of the low cliffs along the coast. Occasionally parties will stop and feed in some sheltered

place, and then there may be several hundreds all together. Again, especially on foggy mornings, numbers may stop and rest on the telegraph wires, party after party coming in till many hundreds are collected, all leaving together.

An attempt was made three years ago to determine the width and direction of this stream, and it was found to extend at least half a mile inland or west from this point, and it was noticed that when travelling by rail from there to Wexford during the flight, birds could be seen from the train on both sides, all the way, all going north. From the ridge of the Mountain of Forth, 4 miles west of Wexford, Swallows could be seen crossing from south to north in a thin but steady stream. Swallows were also to be seen going north-west for at least half a mile from the coast-line.

In 1909 the writer had occasion to spend much of his time afloat in Wexford Bay, his range extending to some $\frac{3}{4}$ mile north-east of Rosslare Pier. It was then noticed that the Swallows, instead of travelling along the coast, were coming in off the sea from the east or south-east. This was confirmed by many observations in 1910, and again this year careful note was taken of all Swallows seen. Generally it was found that the further out to sea the birds were seen, the more truly from E. by S. to W. by N. was the direction of their flight ; on approaching the coast-line this direction was modified, in most cases by becoming more nearly northerly, but where birds made the coast to the north of Rosslare Pier or Greenore Point, they very often, especially on windy days, turned in a more southerly direction, so as to pick up the land at the nearest possible point. Almost invariably when birds were seen travelling at any distance in from the coast-line, their course was as nearly as possible due north. These observations are confirmed by Mr. Glanville, head light-keeper on Tuskar Light, who tells the writer that he has noticed numerous Swallows passing the lighthouse during the autumn, all going from east to west.

The Swallows which arrive here in the spring apparently come from exactly the same direction, but not nearly so many are seen then ; those that are seen usually arrive in

rather dense flocks of a hundred or so, often in a very exhausted condition. They get inland as soon as possible, and do not keep along the coast as the autumn arrivals do.

The notes given below were taken from day to day, and go to show that except for one lot on July 12th, and one lot on November 3rd, the migration was from August 4th to October 20th, when the writer left Rosslare Harbour. The flight on October 20th was quite unlike the usual flight when travelling, being at a much greater height, and at a much slower speed.

It would be extremely interesting to trace the course of these birds in both directions, and to find out at what point they leave the English or Welsh coast, and also to find out how far they hold their northerly course, which is so unexpected at this time of year. This should not be very difficult, as these birds are travelling by day and low down.

A sketch map of part of Co. Wexford is attached, showing the directions observed and the places alluded to in the following notes. (Plate 2).

SWALLOW NOTES, AUTUMN, 1911.

July 12th.—A small scattered flock of about 30 Swallows passed, going due N. about 10.30 a.m., $\frac{3}{4}$ mile N.E. of the end of Rosslare Pier. Some of these looked like young birds.

July 13th to August 3rd.—No Swallows seen.

August 4th.—A fairly steady drift of Swallows in parties of from 4 to 6 birds, passed in a N.W. direction, from about 8.30 a.m. to 9.30 a.m.

August 5th.—Exactly the same as on previous day.

August 6th.—None seen.

August 7th.—Absent from Rosslare Harbour.

August 8th.—None seen.

August 9th.—A number of House-martins, a few Swallows, and a few Sand-martins, passing very irregularly, all in a NW. direction, the House-martins stopping to feed.

August 10th to 16th.—None seen.

August 17th.—At 3 p.m. a small flock of about 30 passed Rosslare Harbour, going to the north-east.

August 18th.—Several small parties of 4 to 6 birds in each passed between 9 and 10 a.m., going N.W.

August 19th to 24th.—None seen.

August 25th.—Several small parties passed about 9 a.m., going N.W.

August 26th.—Same as on previous day.

August 27th.—No Swallows seen.

August 28th.—From 8 to 9 a.m. some hundreds of Swallows passed, going fast in a N.W. direction, very scattered, never more than perhaps 6 or 7 birds in sight at the same time ; as usual, when passing here, all the birds were keeping low. No birds seen after 9.30 a.m.

August 29th.—Very high wind ; none seen.

August 30th.—Large numbers of Swallows coming in from the eastward from 7 a.m., resting and feeding and passing on to the north-west. The flocks are very straggling, but so far there is no steady stream, as seen in former years. The flight lasted till 3 p.m., the Swallows near the shore going W. or N.W., but when observed at a point some $\frac{3}{4}$ mile N. of the end of Rosslare Pier, it was seen that the birds were coming in from the E. or S.E. and that most of them turned due N. The majority passed straight on, but now and then a lot would stop for half an hour and feed ; none stopped to rest except one lot of about 200 that rested from 7.30 to 8 a.m.

August 31st.—About 20 seen passing N.W. about 6 p.m.

September 1st.—No Swallows seen passing, but at 6.30 p.m. a large flock was seen going to roost in some trees about $\frac{1}{2}$ mile inland from here.

September 2nd.—From 1.30 to 5 p.m. large numbers of Swallows came in off the sea from E. and S.E., stopped to feed and rest, and went on W. or N.W. A few House-martins with the Swallows.

September 3rd.—Walked some 4 miles W. from Wexford along the ridge of the Mountain of Forth, saw no Swallows travelling, only a few small lots feeding.

September 4th.—One small lot of about 20 passed about 9 a.m. from S.E. to N.W.

September 5th.—Travelled by 7.45 a.m. train from Wexford to Rosslare; calm and rather foggy morning. From about half way down there were very large flocks of Swallows on the telegraph wires and numbers crossing the line, the general direction being W. or N.W., but one large flock crossed the line going nearly due S. The flocks overlapped, and one was never out of sight of scores of birds, from about a mile to the Wexford side of Rosslare Strand station, to Rosslare Harbour. On arriving at Rosslare Harbour at 8.15 a.m., a continuous stream of birds was found to be passing up the coast W. or N.W., and out in the bay, $\frac{3}{4}$ mile to the N. of the pier-head the stream was found to be nearly due N., and quite as dense as along the shore. The stream extended out to sea as far as could be seen. It ceased quite suddenly at 11 a.m. and no more birds were seen except about 20 at 1.30 and half-a-dozen at 4.30 p.m. Nearly all birds seen were Swallows, only a few House-martins were noticed with them.

September 6th.—A thin stream of Swallows passed from 7.30 to 8.30 a.m., as usual from S.E. to N.W.

September 7th to 14th.—No large numbers passed, but each day small parties of a few dozen each passed, generally between 8.30 and 9.30 a.m., always going in a direction between N. and W. In all parties that stopped to feed and so could be carefully observed, there were young birds present.

September 15th.—At 8 a.m., cold and wild, some hundreds of Swallows passed, going very nearly due N., and almost dead against the wind.

September 16th and 17th.—None seen.

September 18th.—Very fine and calm; large numbers of Swallows passed up the coast, N.W. from 8 a.m. to 2 p.m. During much of this time I was out in the bay well to the N. of the pier, and could see the birds coming in from the E. and S.E. Some of them—and I think they were the more tired—turned in a S.W. direction, as, by doing so, they could reach the coast sooner; others kept a much more northerly course, as if content to pick up the land some miles further to the N.

September 19th.—During the forenoon, with a strong S.W. wind, a lot of Swallows came in from the E. and N.E. The latter were, I think, birds that had made their land-fall a little to the N. of this, and had turned S. so as to pick up the land at the nearest possible point.

September 20th.—When at sea, $\frac{1}{2}$ mile to the N. of the pier, a few came in from as nearly as possible due E.

September 21st and 22nd.—None seen.

September 23rd.—A very considerable number of both Martins and Swallows, both old and young birds, came in from an easterly direction, stopping to feed and rest, and not simply passing on at once as they usually do. By 10 a.m. there was a flock of some 300 or 400 flying about feeding or resting on the telegraph wires, with small parties still coming in. Ten minutes later they had all gone, but as I did not see them go, I cannot say what direction they took.

September 24th.—From about 8.30 to 10 a.m., there was a thin stream of Swallows passing N.W. along the coast. No birds stopped for more than a few minutes to feed, but seemed to be in a hurry to get on.

September 25th.—A considerable number of Martins and Swallows arrived from the E. and hung about feeding till after 10 a.m. Did not see in what direction they left.

September 26th.—About half-a-dozen Swallows passed, going N.W.

September 27th.—A few score Swallows passed, going N.W. from 8 to 9 a.m., and from about 10.30 to 11.30 a.m. ; a considerable number came in from due E. off the sea.

September 28th.—No Swallows observed during the forenoon ; one small lot passed, going N.W. about 5.30 p.m. A number of Meadow-pipits passed going due N. well out at sea.

September 29th.—About a dozen passed, 2 to 4 p.m., one by one, going N.W.

September 30th.—None seen.

October 1st.—At 10 a.m. 2 Swallows passed, going N.W., 1 more at 2.30 p.m. At 3.30 p.m. a flock of several score were feeding in the shelter to the S. side of Greenore Point, these all left at 3.45, going W. or N.W. up the coast.

October 2nd.—At 3.15 p.m. about a dozen Swallows passed going N.W.

October 3rd to 7th.—None seen.

October 8th.—A flock of about a dozen Swallows was seen about $\frac{1}{2}$ mile inland from here, going very fast nearly due N. about 3.30 p.m.

October 9th to 11th.—None seen.

October 12th.—At about 9 a.m. a score of Swallows arrived and remained about feeding for half-an-hour, and from about 2.30 to 4.30 p.m. there were a considerable number—probably 400 to 500—feeding about or resting on the telegraph wires. I did not see either lot arrive or depart.

October 13th and 14th.—None seen.

October 15th.—When on the ridge of the Mountain of Forth, about 4 miles W. of the town of Wexford, saw about a dozen Swallows going due N.

October 16th and 17th.—Saw no Swallows.

October 18th.—At 8 a.m. saw about a dozen Swallows pass the Pier coming in from the N.E. Weather very foggy and these birds, which were very tired, had probably come in from due E. and turned a little S. on seeing the pier.

October 19th.—None seen.

October 20th.—From noon to 12.15 a very large flock of Swallows and Larks, came drifting slowly in from the E. and S.E. The whole large flock was moving very slowly and irregularly, and was so high up that it was at first difficult to see what the birds were.

October 21st to November 2nd.—Was away from Rosslare Harbour.

November 3rd.—From 8 to 8.45 a.m. about a dozen House-martins were flying about and feeding; did not see them arrive or depart.

November 4th.—Left Rosslare Harbour and was away till the 13th. Saw no more Swallows.

NOTE ON THE ABOVE OBSERVATIONS.

BY RICHARD M. BARRINGTON, M.A., F.L.S.

As Mr. Delap was about to leave Rosslare—where he had been stationed for 10 years as Resident Engineer to the G. S. and W. Railway (Ireland), and G. W. Railway (England)—I asked him to send some of his remarkable notes on the autumn migration of Swallows to the *Irish Naturalist*. The direction of flight is exactly contrary to what might be expected, and is so puzzling that at present I am not prepared to offer any explanation. Of this, however, I am satisfied, that Mr. Delap's observations may be strictly relied upon.

Fassaroe, Bray

THE BURNT GROUND FLORA OF KILLINEY HILL.

BY NATHANIEL COLGAN, M.R.I.A.

OBSERVATIONS on what may be conveniently termed the renascence floras of burnt ground areas are of interest from two points of view, since they may be expected to afford evidence not only of the disseminative powers of certain plant species, but also of the relative vitalities of various seeds when exposed to high temperatures. In the July number of this Journal for 1908, Mr. Adams drew attention to this subject in a paper on "The New Flora of Burnt Ground on the Hill of Howth," giving the results of his examination of a burnt area two years after its flora had been wiped out by fire. In the present paper I propose to give the results of observations made on a similar area on Killiney Hill at a much shorter interval—two to three months—after the destruction by fire of its flora.

Residents on the southern shores of Dublin Bay will recollect that on the occasion of the royal visit to Ireland last year the Killiney Town Council resolved to contribute

its quota to the general scheme of decoration by illuminating the obelisk on Killiney Hill. The point was rightly considered an admirably situated one for the purpose, and to take full advantage of it, a scaffolding was run up round the obelisk with high platforms for the discharge of rockets and the display of red and blue fires. When the Killiney Hill illuminations were set going at 10 o'clock on the night of the King's arrival at Kingstown (July 7th), watchers by the shores of the bay confessed to a feeling of disappointment, for many of the rockets, though they soared into the night high above the obelisk, failed to explode at their zenith and fell back ineffectually, as it seemed, to the wooded hill slopes. But those who remained abroad until the approach of midnight had no reason to be disappointed with the Killiney illuminations. About that hour the whole hill-top was seen to be on fire, and the decorative effect exceeded the most sanguine expectations. The rockets had evidently exploded amongst the old Gorse spinneys on the hill, and these, dry as tinder from a long spell of fine weather, had caught fire in many places at once. It seemed, indeed, as if Killiney would be provided with an abiding memorial of the royal visit in the shape of a ruined beauty-spot, for, viewed from the bay shores a mile or so distant, the fire looked fierce enough to destroy utterly the woods that clothe the hill-slopes.

On the 9th July, two days after the fire, I visited the hill and was agreeably surprised to find the devastation less serious than I had expected. Large areas of fine old Gorse spinney near the summit and towards the east, north-east and west slopes, were completely burnt, and here and there the thin layer of peat underneath was still smouldering, while in places an inch or so of the underlying soil was calcined. But, happily, the efforts of the keepers had been successful in saving the adjoining woods, only an occasional tree on the edge of the burnt area having caught fire. A few days later the charred stems of the old Gorse were cut down and cleared off, leaving the blackened burnt areas, it is hardly necessary to say, absolutely devoid of vegetation.

On the 3rd September, less than two months after the fire, I made a first careful examination of the burnt ground with

the following result. Fresh, green shoots, fully three inches in length, were found springing from the Gorse stumps, the Wood Sage (*Teucrimum Scorodonia*) all over the burnt areas had sent up from the old roots shoots six inches in length, while *Rubus fruticosus* had already developed trailers up to twelve inches long. Everywhere amongst the charred stumps Gorse seedlings were numerous, the first leaves just showing between the opened cotyledons.

A week later (September 10th), I paid a second visit to the burnt ground in company with Mr. R. A. Phillips, when we added to the renascence flora three species : *Galium saxatile*, *Senecio sylvaticus*, and *Glechoma hederacea*, all of which occurred as seedlings.

In the next month, October, I paid two visits to the hill, one on the 1st, the other on the 8th, with the result that the burnt ground flora was further increased by five species, *Senecio vulgaris*, *Sonchus oleraceus*, *Anagallis arvensis*, *Rumex Acetosella* and *Cardamine hirsuta*. The three last of these occurred as seedlings, the two first as well grown, flowering specimens which had gone through all their stages from germination to flowering within a bare three months.

The net result of the observations made in September and October was the discovery on the burnt ground areas of Killiney Hill of a total living flora of eleven species, all of which had made their appearance on this vegetable *tabula rasa* within a period of three months. The following is a full list of this renascence flora :—

<i>Cardamine hirsuta.</i>	<i>Glechoma hederacea.</i>
<i>Ulex europaeus.</i>	<i>Teucrimum Scorodonia.</i>
<i>Galium saxatile.</i>	<i>Anagallis arvensis.</i>
<i>Potentilla Tormentilla.</i>	<i>Rumex Acetosella.</i>
<i>Sonchus oleraceus.</i>	—
<i>Senecio vulgaris.</i>	<i>Rubus fruticosus.</i>
<i>S. sylvaticus.</i>	<i>Carex binervis.</i>

The two species last-named in the above list occurred only as fresh shoots from old root-stocks ; three others in the list—*Ulex europaeus*, *Potentilla Tormentilla* and *Teucrimum*

Scorodonia—occurred both as seedlings and as fresh shoots, so that five species, all of them perennials as might have been expected, succeeded in living through the fire in their old stations.

The survival of these perennial root-stocks offers nothing very worthy of notice ; but the appearance along with their renascent shoots of numerous seedlings belonging to eleven distinct species raises a question of considerable interest. Are we to assume that the seeds of all of these eleven species were somehow conveyed to the burnt ground areas after the fire from adjoining areas untouched by the fire ? And, if not, how many and which of them may we conclude to have sprung from seeds which lived through the fire in the areas where they appeared as seedlings after the fire ? Three out of the eleven species, *Senecio vulgaris*, *S. sylvaticus* and *Sonchus oleraceus*, since they grow freely all round the burnt areas and have seeds provided with highly efficient contrivances for seed dispersal, may, with little fear of contradiction, be assumed to have migrated to the burnt ground. With one exception, the Gorse (*Ulex europaeus*), none of the remaining eight species possesses any very efficient means of seed dispersal, for the elastic pods of *Cardamine hirsuta* can project the seeds for only a few inches. In the case of the Gorse, however, it is by no means improbable that the seeds found germinating on the burnt areas were forcibly discharged from the Gorse bushes that bore them by the action of the fire on their elastic pods, and this explosive discharge may have projected the seeds from the active fire zone to an adjoining burnt area where the fire had already spent itself.

We are not, then, coerced to the conclusion that the Gorse seeds lived through the fire in the very spots where they were found germinating less than two months after the fire. Are we coerced to such a conclusion in the case of the remaining seven species found on the burnt ground in the seedling stage, i.e., *Cardamine hirsuta*, *Potentilla Tormentilla*, *Galium saxatile*, *Glechoma hederacea*, *Teucrium Scorodonia*, *Anagallis arvensis* and *Rumex Acetosella* ? I think not, and for the following reasons. The seeds of most of these species

may very well have been introduced to the burnt areas immediately or soon after the fire from closely adjoining unburnt areas. And this may have been effected in one or other of two ways by wind carriage (not necessarily or probably through the air, but along the ground) or by the operations of the park-keepers on the morning after the fire. In their vigorous slashings and tramplings amongst the unburnt or half-burnt thickets and herbage around the burnt areas, with a view to preventing any further outbreak of fire, they could hardly avoid scattering seeds over the blackened and lifeless spaces where the fire had already done its work. And if in the case of any one of the seven species just mentioned these means of dispersal had proved inefficient, may not the disturbance of the soil of the burnt ground, partly by the burning of the upper crust, partly by the trampling of the keepers, have set free some seeds which lay dormant and protected from burning a few inches below the surface ?

On the whole, then, the observations made last year on the Killiney Hill burnt ground afford no sufficient proof that any one of the eleven species found there in the seedling stage within three months after the fire originated from seed which had survived a full exposure to that fire. Nor, must it be confessed, do they yield any proof to the contrary ; for it may be that the hard, nut-like fruits of the Labiates, *Glechoma hederacea* and *Teucrium Scorodonia*, are quite capable of enduring degrees of heat greater than any caused at or close to the ground surface by the combustion of an old Gorse spinney. Inconclusive as the observations have been, they may at least have a certain interest as showing how strongly nature in these temperate regions abhors a vegetable vacuum.

Sandycove, Co. Dublin.

ICHNEUMONIDAE AND BRACONIDAE FROM THE NORTH-EAST OF IRELAND.

BY REV. W. F. JOHNSON, M.A., F.E.S.

In my last contribution on this subject (1904) I enumerated twenty-seven species, and I am now able to add about double as many. I am greatly indebted to Mr. Claude Morley, F.E.S. for kind assistance in the determination of my specimens, and to Mr. H. L. Orr, for sending me many admirable specimens from Belfast and the neighbourhood. Several of the species are rare according to our present knowledge and interesting from a distributional point of view. Those from Belfast and neighbourhood, as well as those from Richhill, were taken by Mr. Orr, the rest by myself.

ICHNEUMONIDAE.

ICHNEUMONINAE.

- Coelichneumon consimilis***, Wesm.—Belfast, 12th June, 1909.
- Stenichneumon trilineatus***, Gmel.—Female. Richhill, 14th August, 1909.
- Cratichneumon rufifrons***, Grav.—Male. Cave Hill, near Belfast.
- C. fabricator***, Fab.—Belfast and Cave Hill Road, near Belfast.
- C. annulator***, Fab.—Male. Cave Hill.
- Barichneumon albicinctus***, Grav.—Belfast, Poyntzpass.
- Ichneumon lugens***, Grav.—Female. Holywood, Co. Down ; Carr's Glen, Co. Antrim, 24th February, 1912. The specimen taken by Mr. Orr in Carr's Glen was found under loose bark on a birch tree. This is the first British record of its hibernation. It is a rather rare species in the British Islands.
- I. bucculentus***, Wesm.—Male. Coxtown, Co. Donegal.
- I. suspiciosus***, Wesm.—Holywood. Neither species common.
- I. terminatorius***, Grav.—Magheramorne, Co. Antrim, 5th April, 1910. Has been recorded from Rossbeigh, Co. Kerry. There are not many English records.
- I. stramentarius***, Grav.—Male. Lough Shark, Co. Down, and Poyntzpass. Not recorded from Scotland and rare in England.
- I. extensorius***, Linn.—Garfield Street, Belfast.
- Chasmias motatorius***, Fab.—Female. Cave Hill, 13th April, 1909.
- Phaeogenes planifrons***, Wesm.—Poyntzpass.
- P. rusticatus***, Wesm.—Poyntzpass. Mr. Morley has only two records from England and one from Scotland, but thinks the insect may not be uncommon.

Dieaelotus rufilimbatus, Grav.—Poyntzpass, 9th March, 1910. Scarce, recorded from near London and from Cornwall.

Colpognathus divisus, Thoms.—Female. Poyntzpass, in moss, 2nd February, 1910.

CRYPTINÆ.

Macrocryptus nigrocinctus, Grav.—Male. Poyntzpass.

Glypichnemis vagabunda, Grav.—Female. Cave Hill, 31st July, 1909. Found on umbelliferous flowers; rare in Great Britain.

G. erythrogaster, Grav.—Female. Poyntzpass, 9th August, 1909.

Phygadeuon variabilis, Grav.—Male. Poyntzpass.

P. dumetorum, Grav.—Male. Poyntzpass, 30th August, 1909.

P. fumator, Grav.—Poyntzpass, 9th March, 1910.

Pezomachus fasciatus, Fab.—Poyntzpass, in moss, 2nd February, 1910.

Atracodes vestalis, Hal.—Belfast, 13th June, 1909.

Spilocryptus incubitor, Ström.—Female. Richhill, 10th August, 1909.

Poyntzpass.

S. migrator, Fab.—Male and female. Garfield Street, Belfast.

Cryptus obscurus, Grav.—Male. Cave Hill.

C. tuberculatus, Grav.—Poyntzpass. A rare species in England. Mr. Morley has taken it on elm.

Habrocyptus porrectorius, Fab.—Female. Cave Hill.

PIMPLINÆ.

Perithous mediator, Fab.—Female. Poyntzpass, 7th July, 1911.

Pimpla brevicornis, Grav.—Male. Poyntzpass, 30th August, 1909.

P. calobata, Grav.—Poyntzpass, 9th October, 1909.

P. examinator, Fab.—Male. Cave Hill.

P. examinator-turionellæ, Linn.—Belfast, 13th June, 1909. These two species come very near each other, the difference being mainly in the colour of the coxae. The present specimen has the coxal partly black and partly red, thus being intermediate between *P. examinator* which has black coxae and *P. turionellæ*, which has red coxae.

P. turionellæ, Linn.—Belfast, 13th June, 1909.

Clistopyga incitator, Fab.—Female. Poyntzpass, 12th July, 1910.

Glypta lugubrina, Holmgr.—Poyntzpass.

Lissonota nitida, Bridg.—Poyntzpass, 6th August, 1909. Mr. Morley has only two records of this species, both made by himself—one at Matley Bog in the New Forest and the other at Monks' Soham, Suffolk.

L. ubellator, Grav.—Male and female. Poyntzpass, 30th July and 9th October, 1909. Male. New Forge, near Belfast, 28th August, 1909. from Poyntzpass, 30th July, 1909, has pale, vertical orbits, in this The female approaching the coloration of the male.

L. variipes, Desv.—Poyntzpass, 30th August, 1909.

L. cylindrator, Vill.—Poyntzpass.

L. sulphurifera, Grav.—Male. Poyntzpass, 9th October, 1909.

Meniscus murinus, Grav.—Poyntzpass, 3rd June, 1909, on bramble.

TRYPHONINÆ.

Homocidus cinctus, Grav.—Female. Cave Hill.

Promethus sulcator, Grav.—Female. Belfast, 13th June, 1909.

Phthorimus anomalus, Morley.—Female. Poyntzpass, 30th July, 1909.

Mr. Morley states that this is the second known specimen of this species, which he described in 1905.

Dyspetes praerogator, Linn.—Poyntzpass, 30th July, 1909. Mr. Morley gives Enniscorthy and Courtown as Irish localities for this species.

Tryphon elongator, Fab.—Male, Richhill, 14th September, 1909. Female. Poyntzpass, 30th July, 1909.

Catoglyptus fortipes, Grav.—Poyntzpass, 26th June, 1907. Cave Hill, 1910.

Perilissus rufoniger, Grav.—Female. Giant's Ring, near Belfast, 29th May, 1909.

OPHIONINÆ.

Campoplex lapponicus, Holmgr.—Male. Newcastle, Co. Down, 7th August, 1909, on sand-hills.

BRACONIDÆ.

AREOLARI.

Earinus nitidulus, Nees.—Female. Poyntzpass, May, 1910. Rev. T. A. Marshall says of this species : " Unknown to me ; the only authority for its occurrence is Curtis, " Guide," 2nd edition column 116."

POLYMORPHI.

Blacus ruficornis, Nees.—Poyntzpass, in moss, 2nd February, 1910.

Macrocentrus marginator, Nees.—Poyntzpass. Recorded by Haliday from Ireland and the Hebrides.

EXODONTES.

Alysia manducator, Pariz.—Belfast, 13th June, 1909.

Coelinus elegans, Hal.—Armagh, 19th May, 1894.

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T. A. MARSHALL.—" Monograph of British Braconidæ." Trans. Ent. Soc., 1885, 1889, 1894-1899.

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Acton, Poyntzpass.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include five Raccoons from the Right Hon. J. Hogg, a Chough and a Raven from Mr. W. Trenowath, a Naked-footed Owlet from Professor C. J. Patten, Pochards from Messrs. R. J. Ussher and C. J. Carroll, Formosa Teal from Messrs. R. M. Barrington and W. J. Williams, five pair of Mandarin Ducks from Mr. J. W. Lentaigne, Widgeon from Messrs. H. B. Rathborne and W. J. Williams, and a Redshank from Mr. Mead and a Shag from Mr. W. J. Williams.

An American Opossum, five Cordon Bleu Waxbills and three Pintail Ducks have also been acquired. Six Dingo Puppies have been born in the Gardens.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

MARCH 5.—Professor J. A. Lindsay (President) in the chair. Dr. R. F. SCHARRFF, of the National Museum, Dublin, lectured to a large audience on "The Aims and Scope of a Provincial Museum." The lecture, which dealt with the ideals of a modern museum, and the nature of the exhibits that might be especially suitable in such a centre as Belfast, will be shortly published in abstract in our pages. In view of the proposed new Public Museum to be established in the Botanic Garden Park, Belfast, the lecture evoked much interest. W. Gray, Dr. A. Trimble, James Corr, R. Welch, Alec Wilson, Professor Symington, F.R.S.; R. M. Young, Sir Otto Jaffe, and Professor Gregg Wilson took part in the discussion.

At a meeting of the Technical Instruction Committee two days later, it was resolved that the address be issued in full by the Curator of the Public Museum in his "Quarterly Notes."

BELFAST NATURALISTS' FIELD CLUB.

FEBRUARY 20.—R. J. Welch (President) in the chair. Professor G. H. CARPENTER lectured to a large audience on "Recent Advances in the Evolution Theory." Referring to the Darwin Centenary Meetings in 1909, he pointed out that while the general principle of evolution is, on almost all hands, accepted, the value of natural selection is still, and is likely to remain, a matter of dispute. As an example of the many pieces of recent evidence afforded by palaeontological research, the discovery by Dr. C. W. Andrews in the Eocene of Upper Egypt of primitive proboscidean genera was mentioned. Morphological research, though now somewhat unfashionable, has been proved fruitful by the establishment of relationship between primitive insects and crustaceans. The discussion as to the relative importance of the Darwinian factor of natural selection

and the Lamarckian factor of use-inheritance still goes on, not always in the most strictly scientific spirit. Natural selection explains readily adaptive characters that are often common to large zoological groups. But can it explain specific differences that have no apparent utility to their possessors? Can it be due to natural selection, for example, that the caterpillar of *Smerinthus populi* has a green tail-horn and the closely similar larva of *S. ocellatus* a blue one? And an enormous number, probably the majority, of specific differential characters are of such a nature. Yet there can be no doubt that the influence of natural selection on the world of life is great and continuous. Can as much be said for the use inheritance? On the one hand we have that great Darwinian, Professor Weismann, with his theory of the continuity of germ-plasm from one set of gametes to the next, the bodies of successive generations regarded almost as bye-products of the germ cells, which they are unable to affect, ruling use-inheritance out of court. On the other hand we have the belief, still held by many, that the body of the individual, affected by exercise or environment, can influence the germ-cells that it encloses. In support of this view there were put forward in former years many unconvincing experiments of the nature of mutilation and much ingenious speculation. Recently we have had the suggestive and valuable breeding experiments on salamanders and toads carried out by Dr. P. Kammerer, of Vienna. He found, for example, that Spotted Salamanders subject to cold and drought produced young approaching those of the Black Salamander, and that three years later the offspring of these, breeding in conditions normal to their species, produced young still resembling somewhat those of the black kind. Such facts seem to tell strongly in favour of use-inheritance, yet it must be admitted that the germ-cells of the salamanders may be directly affected by the surroundings, and that the phenomena in such obviously plastic organisms may be due to "ancestral conditions latent in the germ-cells, and called forth by appropriate stimuli." However probable may seem the action of use inheritance, we must still admit it "not proven." Though Darwin, in his late years, attached much importance to slight "continuous" variations in the production of new species, discontinuous variations may be of great value in the evolutionary process, and the study of discontinuous variation leads us directly to the work of Mendel, published in 1865, neglected for more than thirty years, and rediscovered only at the very end of the nineteenth century. The most marked advances in the evolution theory during the past ten years have undoubtedly been along the lines of Mendelian research. The simpler results at least of the Mendelian breeding experiments are now generally known among naturalists. With the light thrown on reproductive operations by these results—harmonising as they most wonderfully do with observed facts as to the reducing nuclear divisions in the maturation of the germ-cells—the practical breeder of animals and plants can often combine characters so as to produce within limits certain desired results, while the student of evolutionary theory perceives how differentiated characters can be segregated and fixed apart altogether from their utility or from the action of use-inheritance. The most recent advances in Mendelian work make it at least highly probable that in many animals sex-differentiation is itself a Mendelian factor.

Mendel's work began with experiments in hybridising, and we need to remember that every sexual union is more or less of the nature of a "cross." Without claiming that "Mendelism" explains all the facts of inheritance, we may admit that it gives at least the promise of explaining very much. And an explanation of the fixation of definite characters of no utility in the "struggle for existence" is exactly what we need as a supplement to natural selection. But if we know something of the nature of variation and the "laws" which govern inheritance, the cause of variation is still largely a mystery.

Professor Gregg Wilson proposed a vote of thanks to Professor Carpenter, and commented on the capable manner in which the lecturer had dealt with this very wide subject. F. Balfour-Browne, in seconding the vote, raised an interesting point of discussion on the possibility of descent along parallel lines.

The vote having been put to the meeting by the President and passed with acclamation, Professor Carpenter briefly replied.

FEBRUARY 28.—GEOLOGICAL SECTION—Paper by W. J. C. TOMLINSON, chairman of the Section, on "Geological Aspects of Coast Erosion," illustrated by lantern views. Dr. A. R. Dwerryhouse, F.G.S., presided. Mr. Tomlinson pointed out that coast erosion arises in the main from the operation of two classes of agents—the first aerial, the second, marine; the marine agents being again divided into two groups—the one direct, the other indirect. The waves, by their direct action, break down cliffs and coast-lines and thus lead to the formation of caves and coves, bays and inlets, cliffs and promontories. By their indirect action, in gathering up the products of erosion and transporting them to other grounds, they provide a fresh field of attack for the direct agencies. Mr. Tomlinson also drew attention to other processes that aid in coast degradation, such as the pressure exercised by the water when driven with great force into the cracks, fissures and joints of the rocks, and to the pneumatic effect produced by the alternate compression and expansion of the air, imprisoned in such crevices and fissures. He concluded with a full account of how these coast-eroding agencies were circumscribed in their activity by the nature, structure, and arrangements of the rocks composing the coast line. A discussion followed, in which R. J. Welch, M.R.I.A., Wm. Gray, M.R.I.A.; S. A. Bennett, B.Sc.; C. A. Cunningham, L.D.S., and the Chairman took part.

DUBLIN NATURALISTS' FIELD CLUB.

FEBRUARY 10.—EXCURSION TO BRAY HEAD.—A party of about thirty-five members and visitors left Harcourt Street Station by the 1.30 p.m. train for Bray. On arrival at Bray Station, the party, conducted by the Rev. W. J. Ryan, S.J., proceeded to Bray Head with the object of searching for fossils in the rocks which had fallen in the recent landslip, and incidentally of visiting the locality where the new fossils had been found last year by the Conductor. With the kind permission of the Dublin and South-eastern Railway authorities, the members were enabled to reach the scene of the landslip, south of the first tunnel, by proceeding along the railway line from Bray. Mr. Archer, Permanent Way Superintendent, accompanied the party and made himself responsible for its safety. The Conductor demonstrated the geological features of the rocks passed *en route*, and explained the importance of the discovery of the new fossils found at Brandy Hole in fixing the stratigraphical position of the Bray and Howth Series, which had hitherto been variously referred to the Cambrian and Upper Silurian systems. Specimens of Oldhamia were found by many of the members, but no one was fortunate enough to find fossils of any other type. The day was ideal as regards weather conditions, and the members thoroughly enjoyed the excursion.

FEBRUARY 13.—At the Business Meeting of the Club, which was held at the Royal Irish Academy House, N. COLGAN, M.R.I.A., delivered an interesting lecture on "Plant-hunting in the Pyrenees." The lecture was illustrated by about sixty lantern slides. At the close of the meeting Mr. Colgan showed some illustrative plant-specimens.

NEWS GLEANINGS.**The Geological Society and Dr. Dwerryhouse.**

At the recent annual meeting of the Geological Society, the President, on behalf of the Society, presented a moiety of the balance of the proceeds of the Lyell Geological Fund to Dr. Arthur Richard Dwerryhouse, D.Sc., F.G.S., Lecturer on Geology, Queen's University, Belfast. In making the presentation, Professor Watts spoke of the services of Dr. Dwerryhouse. In each locality he had discovered something new, and something throwing fresh light upon the conditions that prevailed during the Glacial epoch. He had also been able to pursue inquiries along other lines; for instance, the circulation of underground waters, the origin of caves, and the weathering of rocks, while in his presidential addresses to the Liverpool Geological Society he had dealt with far larger geological problems. As a contributor to the *Glacialists' Magazine*, as secretary for several years of Section C. of the British Association, and as a member of the Committee on Erratic Blocks, he had discharged other duties to the science. Finally, his recent work on geological maps would be of great help in educating students to deal in the laboratory with geological problems which they would have later to face in the field.

NOTES.**ZOOLOGY.****Irish Reed Warblers.**

I have just received a letter from Mr. Ussher telling me that in the *Scientific Proceedings, Royal Dublin Society*, vol. xii., 1909, p. 19, Mr. Barrington records the occurrence of a female Reed-Warbler which was killed striking at Rockabill lighthouse on October 20th, 1908. This bird is mounted in Mr. Barrington's collection. Furthermore, that a leg and a wing of another Reed-Warbler have since been identified among the numerous specimens collected by the same ornithologist. I had a notion that a Reed-Warbler had been recently obtained at Rockabill, having remembered that Mr. Barrington made mention of the fact when I saw him last autumn in London; however, when I failed to find the record in the *Museum List* (last edition by Ussher, 1908), *Irish Naturalist, Zoologist, British Birds*, and some other periodicals, and never dreaming that he would bury this important record in the Proceedings of a Society not available to many readers of general ornithology, I concluded that perhaps Mr. Barrington was perpetrating a joke. But he was in earnest, and so my two Tuskar specimens must therefore rank as the third record, hardly third and fourth records, seeing that my birds were obtained almost simultaneously. My best thanks are due to Mr. Ussher for drawing attention to this matter and for supplying me with the data, especially as we have not got vol. xii. of the Proceedings above-mentioned in our libraries here.

The University, Sheffield.

C. J. PATTEN.

"Birds New to Ireland."

Professor Patten says (*Irish Naturalist*, March, 1912, pp. 49-51), that he obtained three birds at the Tuskar not heretofore included in the Irish list. He has overlooked the occurrence of the Reed Warbler at Rockabill, October 20th, 1908, *Scientific Proc. Roy., Dub. Soc.*, vol. xii. (N.S.), p. 19.

As to the Blue-headed Wagtail, immature specimens are so difficult to distinguish from those of the Yellow Wagtail that the late Professor Newton, of Cambridge, declined to name them for me. If the white eye-stripe is the test, then the Blue-headed Wagtail was obtained at the Tuskar, September 19th, 1895, but I declined (see *Migration of Birds*) to add it to the Irish list on the strength of my doubtful specimen which has most, if not all, the characters mentioned by Professor Patten.

Alauda cantarella is apparently a Mediterranean form of the Common Skylark, a species more variable in wing measurements, etc., than probably any other British bird. Professor Patten kindly showed me his specimen, and I should hesitate to include this form in the Irish list, as it may be only a pale specimen of the Common Skylark.

Fassaroe, Bray.

RICHARD M. BARRINGTON.

ON PROVINCIAL MUSEUMS.

BY R. F. SCHARFF, PH.D., B.SC.

[Abstract of Lecture to the Belfast Natural History and Philosophical Society, 5th March, 1912.]

At the outset of my address I would refer to the origin of Museums and their gradual evolution. The first scientific Museum actually founded was begun at Oxford in 1667 by Elias Ashmole, and to the present day this is still known as the Ashmolean Museum. Some time later Sir Hans Sloane, a native of Ulster, founded a private Museum in London. It was a great collection of curiosities as well as valuable books and manuscripts which on his death in 1749 was bequeathed to the nation and formed the nucleus of what is still the finest and largest Museum in the world—the British Museum. In the same century this newly-opened vista of popular education rapidly spread through almost every country in Europe. In Ireland, the Royal Dublin Society took the lead and actually opened the doors of its newly-established Museum to the public in February, 1733. More than half a century later came the Great Exhibition in London in 1851, as the outcome of which a great system of educational Museums arose throughout the United Kingdom. The popular conception of a Museum as a repository for curiosities has now passed away, and a new order of things has been established. The new functions of Museums are now thoroughly understood, and if people cannot always carry out their ideas they at any rate know what they want.

As regards the construction of Museum buildings, it must be maintained that few Museums have not grievously suffered from the eminent architect. Frequently he has made rooms too dark, sometimes he has overloaded them internally with ornament, utterly oblivious of the fact that no ornament of any kind should be tolerated in the interior of a Museum, and that light is the foremost of all the essential qualities of the building. It has been truly remarked that the value of a Museum will not be tested by its contents as a means of

the advancement of knowledge, but by the treatment of these contents. Hence the making of a Museum depends on the knowledge of the curator and his ability to apply that knowledge in the arrangement of his collections. A Museum is like a living organism, it requires continual and tender care. It must grow or it will perish, and great cost and labour are required to maintain it in a state of vitality.

I would urge upon any Museum committee the desirability of appointing a curator before the museum is built. Let the curator then form the nucleus of a collection and carefully study the plans of all the more important modern Museums, especially as regards space, lighting and heating, so as to enable him to aid in devising a proper scheme for housing the collections. The scope of the Museum should be strictly defined. In a great industrial city, like Belfast, with its wonderful shipbuilding and linen and other industries, it seems very desirable that some rooms in its Museum should be set apart for an adequate illustration of the rise, history and progress of such industries. The habits and customs of the primitive tribes which once resided in the district or province in which the provincial Museum is situated will form another most worthy object for illustration. The local antiquities, the local zoology, botany and geology, as well as the local arts and art industries should all have parts of the building reserved to them. Here we have to face the great difficulty of space. Moreover every large Museum must divide its collections into two portions, namely, a reserve or study series and an exhibited series. Even in small Museums it is found necessary to keep part of the collections strictly for students and exhibit the remainder. Ample storage accommodation at any rate is essential.

A great many other subjects besides those alluded to may be illustrated in a Museum if the necessary space be available. To give an object lesson of the gradual growth and evolution of the town or city in which the Museum is situated would be not only instructive, but it would tend to rouse an interest among the citizens in the problems of the future expansion and what had been called "town-planning."

The various features connected with the water supply, lighting, and disposal of sewerage, are all capable of illustration in a Museum. These subjects, as well as the construction of roads in ancient and modern times are beautifully shown by models in the great Bavarian Science Museum at Munich.

As regards the method of arranging objects, great changes are now being made in several Museums with a view to improving the teaching value of the collections. The selection and grouping of objects and their preservation, the background, the colour of the rooms and the style of cases are all worth consideration.. Hitherto wooden cases were almost universally employed in Museums. Within recent years, however, it has been discovered that metal is far preferable to wood. Although the cost of metal exceeds that of wood, the advantage of the use of metal is so obvious that the difference in price cannot influence the choice. Metal cases are more readily made dust-proof, they are more fire-proof, more durable and less apt to warp. Such cases have been adopted in several of the great British and Continental Museums and are in every respect considered satisfactory.

Now when we come to the building itself by far the most important feature is that ample daylight should be available for every room and every nook and corner. Some authorities prefer top-light, others are in favour of side-light. But for many objects, particularly small ones, a strong side-light has certainly a great advantage over top-light. The Museum building should be constructed as far as possible of fireproof material. I have mentioned that the collections of every large Museum must necessarily be arranged into two series—namely, an exhibited series and a reserve or study series. The officials of a provincial Museum might be anxious to curtail or even do without the latter, owing to want of space. But the Museum could scarcely manage to fulfil its proper functions if some provisions are not made for the safe storage of study and reserve collections. It is incumbent, therefore, on those who plan a local museum to make ample provision for the storing of such objects and their

preservation from injury, as well as to provide rooms for the staff of officials who looked after these objects.

I would emphasise the desirability of including a lecture theatre in any Museum building, and, in conclusion, would call attention to what have been called "open air Museums," Many interesting and valuable exhibits of earlier civilizations can be accommodated in such establishments, and thus saved from destruction.

National Museum, Dublin.

REVIEWS.

THE AMERICAN FAUNA.

Distribution and Origin of Life in America. By ROBERT FRANCIS SCHARFF, PH.D., B.Sc. Pp. xvi + 497. 21 Maps. London : Constable & Co., Ltd. 10s. 6d. net.

Dr. Scharff's new book fully justifies the eager expectation with which naturalists in this country and elsewhere have looked forward to its appearance ever since the delivery of the series of Swiney Lectures on which it is founded. The length of time that has elapsed between the delivery of the lectures on the "Geological History of the American Fauna" and the publication of the present volume is due to the fact that Dr. Scharff has thought it advisable to amplify and completely re-write the original lectures. In doing so, he believes that he has been enabled to bring out with greater clearness the points possessing most general interest. We entertain no doubt whatever that in the main he has done so, and the industry, care and argumentative force with which so vast a number of facts has been marshalled and presented are beyond praise. Yet we feel sure that all who attempt to follow the reasoning closely will find themselves much handicapped by the want of a summary of the author's main conclusions. Each of the fifteen chapters of which the book consists deals with one particular area, and with the conclusions to which a survey of that area's past and present fauna seems to point. Greenland, for example, is the subject of the first chapter, and Argentina and Chile of the last. There is nowhere a bird's-eye view of the general order in time in which the author supposes the principal changes in the distribution of land and water whose effects he sees in the various faunal interchanges to have taken place. It may be as well to attempt to present

such a view here (imperfect though it must be) pieced together from the contents of the different chapters, and noticing only the largest of the changes supposed to have played a part in the production of the present fauna.

Going back to Secondary times, for which the interest of Dr. Scharff's story centres in South America, we find that he connects by trans-oceanic bridges during the later stages of that vast period, Brazil with West Africa, Patagonia with Australia, and Chile (by a route extending northwards to California and thence bending east) with western Europe. The first-mentioned of these three connections was already tending to break up at the commencement of the Cretaceous period. The connection between Patagonia and Australia is apparently believed to have come somewhat later than the East Brazil to west Africa bridge—at any rate it lasted well into Cretaceous days—and the circuitous bridge from Chile via California to west Europe was of a still later date, and lasted into early Tertiary times. South America as a Continent, however, had not then come into existence, eastern Brazil, at the time of its connection with Africa, being entirely separated from both Chile and Patagonia, as it seems to have still been when the two other great Cretaceous land bridges which either succeeded or survived it broke up and disappeared.

The beginning of the Tertiary Age thus finds at least a fragment of North America (the south-western portion) connected by land simultaneously with western or southern Europe and with a detached western portion of what is now the South American continent (the land bridge to the latter including the much-vexed area of the Galapagos archipelago). Dr. Scharff does not make it quite clear whether this connection between south-west North America and Europe broke down and was renewed again during an early stage of the Eocene Age, but he seems to imply that it was so, since he tells us (p. 120) that the second faunal phase of the Eocene period witnessed a simultaneous appearance of similar faunas in those two regions, which must have been brought about by a land connection that apparently had not existed during the earlier phase.

In Oligocene times, European influence is traced again chiefly in South America, but this time it is by a bridge which includes the Antilles, and apparently does not touch the North American mainland, whose south-eastern parts had not then come into existence, while the south-western parts had probably ceased to be connected by the old Pacific land bridge with either Ecuador or Chile as they had been in early Eocene days. Later, in Miocene times, Dr. Scharff draws a connection across the Pacific between North America and Asia, by a line considerably further south than that across Bering's Strait, which was only bridged at a much later date. Coming on to the Pliocene period, we find two independent land bridges traced from Europe, one from Lapland to the north of Greenland, and the other, which probably lasted into Pleistocene days, forming a great strip of land that embraced Scotland, the Färoes, Iceland, and southern Greenland, stretching to Labrador, and thus communicating with the north-eastern United States.

' It is with the last of these eight great trans-oceanic connections that the student of Irish natural history will, as such, be chiefly concerned ; but it would, of course, be unfair to Dr. Scharff to treat his arguments on that subject as the main feature of his book, in which so many questions of extraordinary difficulty and complexity have been handled with even greater skill and force of argument than the author has shown in his previous books. In intimate connection with Dr. Scharff's view of a late Pliocene connection between Labrador and western Europe must be taken his view of the nature and cause of the Ice Age, on which, discuss it as we may, agreement does not seem likely to be arrived at for a long time. In North America, as in Ireland, Dr. Scharff holds that the Ice Age cannot have been an exterminating factor, since a considerable number of species existed both before and after it in Greenland and other glaciated areas which have not been found fossil outside those areas. Dr. Scharff strongly inclines to the view that the Ice Age was actually caused by a simultaneous closing of the Arctic Ocean to the waters of both the Atlantic and Pacific, which would have the double effect of reducing the temperature north of the barrier and raising it in the regions immediately south of it. Thus he holds that parts of Greenland and Alaska enjoyed quite a comfortable climate during the Ice Age, and were able in consequence to support a much richer fauna and flora than would be possible in either of those countries at the present time.

It may be worth asking here whether Dr. Scharff's argument does not tend to prove rather too much. If the ocean expanse between Europe and North America was bridged during Pleistocene times, and the bridge was broken not long before the commencement of the Glacial Period, the final severance between Europe and North America was not geologically much more remote—if at all so—than (according to Dr. Scharff's elsewhere expressed views) the severance between Great Britain and Ireland. Ought not the west European and North American faunas to be, on that hypothesis, much more closely akin than they actually are ? Dr. Scharff repudiates the idea of a merely discontinuous connection, through an intervening land that may at one time have touched America on the west, and at another time Europe on the east ; arguing that if that were so the transmissions should all have been in one direction, whereas he finds that each of the two continents has sent species to the other. The same bridge that brought the Reindeer—possibly also the Musk Ox—and a few such plants as *Naia flexilis* and *Spiranthes romanzoviana* eastward from America to the British Islands was likewise used by the running beetle *Carabus catenulatus* and the snail *Helix hortensis* to extend their ranges westward into America. Therefore the way was open for a hither-and-thither intermigration between the two continents, and the puzzle is why was the interchange not more general ? Dr. Scharff suggests (p. 25) that part of the bridge was obstructed by glaciers as soon as the Ice Age began. The animals that got over were, in fact, the race-winners, and it is highly creditable to *Helix hortensis* to have been among the successful few !

One cannot help doubting, all the same, whether Dr. Scharff does not dismiss too curtly the idea of a discontinuous land-connection, though it is true that such a connection would not fit in with his ingenious explanation of the origin of the Ice Age. He seems to regard the bridges that he draws as almost literal bridges—too slender and insubstantial to deserve the name of continents, and unlikely, therefore, to have endured long enough to undergo repeated modifications of area, which might bring them more than once into connection with each of the neighbouring continents, and yet never simultaneously touch both. It is, however, inconceivable that strictly freshwater fishes, for instance, could cross the space that separates Europe from America unless the intervening land mass was of sufficiently large dimensions to include river-systems of its own comparable in size with the river-systems of the other continents, and capable of receiving as tributaries—though not necessarily at the same time—and thus mingling the faunas of the rivers of both. Dr. Scharff's argument seems to imply that his Eocene trans-Atlantic land-bridge, which he uses to explain the extension of the range of some freshwater habitants, including the crayfishes, must have deserved the name of a true continent, in which species may well have originated that were carried at one time to America and another to Europe. And it is questionable whether we ought to ignore the possibility of a similar intermediate origin for some of the animals that Dr. Scharff supposes to have travelled direct by his Scotland-Iceland-Labrador bridge the whole way from Europe to America, or *vice versa*.

What, for instance, about *Helix hortensis*? The singular thing about that snail is that though so distinctly local in its supposed place of origin on the European side of the Atlantic, it seems to turn up on nearly all the fragments of the old land bridge, with a regularity that suggests that it must have been much more densely distributed in the region now submerged than it is known to have been in Europe proper. Found, as Dr. Scharff describes, in the Shetland Islands, the Fâroes, Iceland, southern Greenland, and the islands of the north-east coast of North America, as well as on "parts of the opposite mainland," it seems from its present distribution to have been more thoroughly at home in the lost Atlantis than in any other part of its range. Believers in the permanence of oceanic basins will, no doubt, accuse Dr. Scharff of considerable extravagance in the erection of unnecessary bridges for the transportation of forms that may have been accidentally dispersed, or whose apparent relationships to one another may not be so close as is supposed. But the author's arguments on these points, though they will not carry conviction everywhere, are much too strong to be easily met. We may question whether it is possible for him to draw the line where he does, but that is mainly a question of detail. If it were only for the vast number of facts presented in this volume, zoologists would be deeply indebted to Dr. Scharff for the care he has bestowed in bringing it out.

BRITISH AND IRISH TUNICATES.

The British Tunicata. An unfinished Monograph. By JOSHUA ALDER and ALBANY HANCOCK. Edited by JOHN HOPKINSON, F.L.S., F.G.S., Vol. iii. Aggregatae (Ascidiae Compositae). Pp. xii. + 114. Plates li.—lxvi., and frontispiece. London; Ray Society, 1912. Price 12s. 6d. net.

The issue of this volume brings the chequered history of this 'unfinished Monograph' to a happy ending, so far as the systematic portion of the work is concerned. A fourth volume, by the Editor, will supply a Bibliography of the Tunicata, and will probably be some consolation to students of this group, to whom the publication of the Monograph can hardly be an unmixed blessing. A brief account of its history was given in the review¹ of the second volume. The present volume deals with the Compound Tunicates found in the littoral and shallow waters of the British Isles. The pelagic species (*Oikopleura*, *Salpa*, *Pyrosoma*, &c.) were not dealt with by Alder and Hancock. Our knowledge of these forms is of comparatively recent date, though they form a by no means unimportant constituent of the oceanic plankton.

The Compound Tunicates, which form a conspicuous and beautiful feature in the littoral fauna, present to the systematist such great difficulties that they have unfortunately received less attention than they deserve. Their sedentary mode of life, and habit of forming shapeless encrusting colonies on stones and sea-weeds, result in such great variation in external characters, that careful examination and laborious dissection are necessary to determine the species. To these difficulties is added the absence of any modern Monograph dealing with the group. The present volume will to a limited extent fill this gap, and the Editor has wisely supplemented the drawings left by the authors with figures taken from the well-known works of Milne-Edwards and Savigny. At the present day, there seems to be no student of the Tunicata in the British Isles, and if this Monograph stimulates interest in such an interesting and important group, it will not have been issued in vain.

Fifty-three species are described, included in ten genera and three families. In the nomenclature of the present day, the number of species would probably be greatly reduced, whilst that of the genera and families would be increased. A critical revision of all the species described in this Monograph is greatly to be desired. In addition to 135 text-figures, the species are illustrated by 16 coloured plates. A number of species are recorded from Ireland, collected by Thompson, Dickie, Canon Norman, &c. It is of interest to note that Canon Norman, whose portrait forms the frontispiece to the present volume, collected Tunicata in Bantry Bay so long ago as the year 1858.

R. S.

¹ *Irish Naturalist*, vol. xvi., 1907, p. 365.

NOTES ON NON-MARINE MOLLUSCA
FROM SOME IRISH LAKES,

OBTAINED BY THE LATE MAJOR H. TREVELYAN, F.Z.S.
IN 1911.

BY A. S. KENNARD, F.G.S., AND B. B. WOODWARD, F.L.S.

Last year we gave an account of the non-marine mollusca which had been obtained by Major Trevelyan from some Irish lakes in 1910 (*Irish Nat.*, 1911, pp. 46–51), and we had hoped that this might be the first of a series. It is therefore a matter of deep regret to us, as it must be to all Irish naturalists, that Major H. Trevelyan passed suddenly away on January 28th last. He was a true sportsman-naturalist, and his death leaves a void which it will be hard to fill.

The results of his dredgings in 1911 are in every way quite as important as those of the previous year, whilst far more lakes were examined.

ANLABAN LOUGH, CO. FERMANAGH.

This lake is 200 to 250 yards in length, and is situate at an altitude of 1,000 feet.

Pisidium subtruncatum, Malm. *Pisidium Lilljeborgii*, Cless.
casertanum (Poli).

SHEAN NORTH LOUGH, CO. FERMANAGH.

<i>Limnaea pereger</i> (Müll.).	<i>Sphaerium corneum</i> (Linn.)
<i>Planorbis albus</i> , Müll.	<i>Pisidium subtruncatum</i> , Malm.
<i>Ancylus fluviatilis</i> , Müll.	<i>casertanum</i> (Poli.)
<i>Valvata piscinalis</i> (Müll.).	<i>pusillum</i> , Jenyns.
<i>Bithynia tentaculata</i> (Linn.)	

MALLYBREEN LOUGH, CO. FERMANAGH.

<i>Limnaea pereger</i> (Müll.)	<i>Pisidium Lilljeborgii</i> , Cless.
<i>Pisidium pusillum</i> , Jenyns.	

TULLYVOGY LOUGH, CO. FERMANAGH.

<i>Pisidium casertanum</i> (Poli), (Lake form and very globose)	<i>Pisidium mitium</i> , Held.
<i>obtusale</i> , Jenyns (very large and globose)	<i>pusillum</i> , Jenyns.
	<i>Lilljeborgii</i> , Cless. (very large and globose)

LOUGH NACROAGH, CO. FERMANAGH.

Pisidium milium, Held.*Pisidium lilljeborgii*, Cless. (very large and globose).

TULLYNALOOB LOUGH, CO. FERMANAGH.

Pisidium pusillum, Jenyns.

LOUGH AGUSE MORE, CO. FERMANAGH.

Pisidium milium, Held.*Pisidium Lilljeborgii*, Cless.

LOUGH AGUSE MORE WEST, CO. FERMANAGH.

Pisidium Lilljeborgii, Cless.

DERRINTRIG LOUGH, CO. FERMANAGH.

Pisidium pusillum, Jenyns.*Pisidium Lilljeborgii*, Cless.

TULLY LOUGH, CO. FERMANAGH.

Sphaerium corneum (Linn.)*Pisidium milium*, Held.*Pisidium subtruncatum*, Malm.*pusillum*, Jenyns.*casertanum* (Poli.)*Lilljeborgii*, Cless.*obtusale*, Jenyns.

TULLY LOUGH MORE, CO. FERMANAGH.

This is really two small loughs connected by a stream, and is apparently much smaller than when the 1-inch map was constructed. They are situate $2\frac{1}{4}$ miles N.E. of Leggs.

Limnaea peregrina (Müll.)*Pisidium casertanum* (Poli.)*Planorbis albus*, Müll.*nitidum*, Jenyns.*Bithynia tentaculata* (Linn.)*milium*, Held.*Sphaerium corneum* (Linn.)*pusillum*, Jenyns.*Pisidium subtruncatum*, Malm.*Lilljeborgii*, Cless.

LOUGH NAFEOLA, CO. FERMANAGH.

Limnaea peregrina (Müll.)*Pisidium milium*, Held.*Sphaerium corneum* (Linn.)*pusillum*, Jenyns.*Pisidium subtruncatum*, Malm.*Lilljeborgii*, Cless.*casertanum* (Poli.)

GLENCREAWAN LOUGH, CO. FERMANAGH.

Limnaea peregrina (Müll.) *Pisidium Lilljeborgii*, Cless. (one immature individual).
Planorbis nitidum, Jenyns.

FIR LOUGH, CO. FERMANAGH.

A small reed-bordered lake, $2\frac{1}{4}$ miles N.E. of Leggs.

Limnaea peregrina (Müll.) *Sphaerium corneum* (Linn.)
Planorbis albus, (Müll.) *Pisidium pusillum*, Jenyns.
Bithynia tentaculata (Linn.)

RULES POND, BIGWOOD, CO. FERMANAGH.

Valvata piscinalis (Müll.) *Pisidium pusillum*, Jenyns.
Bithynia tentaculata, Malm. *Lilljeborgii*, Cless. (very large)
Pisidium subtruncatum, Malm.

LOUGH SCOLBAN, CO. FERMANAGH.

Limnaea peregrina (Müll.) *Sphaerium corneum* (Linn.)
Planorbis carinatus (Müll.) *Pisidium pusillum*, Jenyns.
albus (Müll.) *milium*, Held.
Valvata piscinalis (Müll.) *Lilljeborgii*, Cless.
Bithynia tentaculata (Linn.)

MEENAMEEN LOUGH, CO. FERMANAGH.

Limnaea peregrina (Müll.) *Bithynia tentaculata* (Linn.)
stagnalis (Linn.)

NAWALSKEY LOUGH, CO. FERMANAGH.

Pisidium casertanum (Poli). *Pisidium pusillum*, Jenyns.
milium, Held. *Lilljeborgii*, Cless.

LOUGH MEENAGHMORE, CO. FERMANAGH.

Limnaea peregrina (Müll.) *Pisidium pusillum*, Jenyns.
Sphaerium corneum (Linn.)

RUSHEN LOUGH, CO. FERMANAGH AND EAST DONEGAL.

Ancylus fluviatilis (Müll.) *Pisidium Lilljeborgii* Cless.
Pisidium pulchellum, Jenyns (young
and very smooth)

LOUGH AWADDY, CO. FERMANAGH AND EAST DONEGAL.

Limnaea praetenuis, Bow. *Pisidium Lilljeborgii*, Cless.
Pisidium pusillum, Jenyns.

KEENAGHAN LOUGH, FERMANAGH AND EAST DONEGAL.

Planorbis carinatus (Müll.) *Sphaerium corneum* (Linn.)
Bithynia tentaculata (Linn.) *Anodonta cygnea* (Linn.)

COLUMBKILLE LAKE, EAST DONEGAL.

Limnaea praetenuis, Bow. *Pisidium Lilljeborgii*, Cless.
Pisidium pusillum, Jenyns.

LOUGH AGHVOG, EAST DONEGAL.

Limnaea praetenuis, Bow. *Pisidium Lilljeborgii*, Cless.
Pisidium pusillum, Jenyns.

ACHESONS LOUGH, EAST DONEGAL.

Pisidium milium, Held. *Pisidium Lilljeborgii* Cless.

LOUGH LEE, EAST DONEGAL.

Amphipeplea glutinosa (Müll.) *Sphaerium corneum* (Linn.)
Limnaea palustris (Müll.) *Pisidium pusillum*, Jenyns.
Bithynia tentaculata (Linn.) *Lilljeborgii*, Cless.

BALLYWARA LOUGH, EAST DONEGAL.

Limnaea palustris (Müll.) *Pisidium pusillum*, Jenyns.
Physa fontinalis (Linn.) *Lilljeborgii*, Cless.
Valvata piscinalis (Müll.)

TULLYNACROSS LOUGH, EAST DONEGAL.

Pisidium nitidum, Jenyns. *Pisidium Lilljeborgii*, Cless.

MEENASKEAGH LOUGH, EAST DONEGAL.

Pisidium milium, Held. *Pisidium personatum*, Malm.

RATH LOUGH, EAST DONEGAL.

Limnæa palustris (Müll.)

LOUGH KIP, EAST DONEGAL.

Sphaerium cornutum (Linn.)

LOUGH NAMNAMURRIVE, EAST DONEGAL.

Limnæa stagnalis (Linn.)
pereger (Müll.)*Bithynia tentaculata* (Linn.)
Sphaerium cornutum (Linn.)

LOWER LOUGH ERNE, EAST DONEGAL.

(Under stones in the water).

Planorbis vortex (Linn.)
carinatus (Müll.)
albus (Müll.)
Bithynia tentaculata (Linn.)*Valvata piscinalis* (Müll.)
Sphaerium cornutum (Linn.)
Pisidium amnicum (Müll.)

CASTLECALDWELL, EAST DONEGAL.

Major Trevelyan sent us a series of shells which he had obtained from between the rails on the permanent way of the railway just east of Castlecaldwell station. There was no water there, but the earth was damp, and there is a stream always running by the side of the railway.

Four species were represented.

Hygromia hispida (Linn.)
Limnæa pereger (Müll.)*Limnæa palustris* (Müll.)
Succinea elegans (Risso.)BOG HOLES NEAR CASTLECALDWELL, $\frac{3}{4}$ MILE
FROM THE RAILWAY.*Limnæa palustris* (Müll.)*Planorbis leucostoma* (Müll.)LOUGHS TO THE W. OF CARNLOUGH (ALT. 1,000
FEET), CO. ANTRIM.*Pisidium pusillum*, Jenyns.*Pisidium Lilljeborgii*, Cless.

(Both very oval).

The following are new comital records :—

- ANTRIM.**—*Pisidium Lilljeborgii*. **E. DONEGAL.**—*Amphipeplea glutinosa*,
Planorbis vortex, *P. albus*, *Anodonta cygnea*, *Pisidium amnicum*, *P. personatum* and *P. Lilljeborgii*.

NOTES ON THE SPECIES.

Limnaea stagnalis (Linn.)—All these examples are decidedly small. Those from Meenameen Lough are much more slender and higher spired than those from L. Namnamurrive, which latter are identical with those previously obtained from Lower L. Erne.

Limnaea pereger (Müll.)—As a rule the examples are small and fragile. The largest are from Meenameen Lough, 18×4.2 mm., with a large but not inflated body-whorl. The shells from Castlecaldwell are quite distinct. They are small with rather a high spire and slightly reflexed at the base of the last whorl. It is probably a question of environment.

Limnaea palustris (Müll.)—All the examples from the lakes are small and slightly eroded. This form seems fairly constant. The shells from Castlecaldwell are quite different. They are very slender and elongated ; those from the railway are 18×7 mm., and mouth aperture 7 mm. high. One from the bog holes measures 21×7.6 mm., mouth aperture 8 mm. high. We have seen no examples either from Great Britain or Ireland that are so extreme as these. It is the *L. turricula*, Held, of German authors.

Limnaea praetenuis, Bow.—We can now add five additional localities for this species—Loughs Golagh, Scalban, Cclumbkille, Aghvag, and Awaddy. We still consider that this is a good species and quite distinct from *pereger*. It is sometimes difficult to distinguish with young individuals, but there is no difficulty with adults.

Amphipeplea glutinosa (Müll.)—This is a welcome addition to the fauna of East Donegal.

Anodonta cygnea (Linn.)—One living example only was taken from Keenaghan Lough. It is the form known on the Continent as *A. celtensis* Schrot. Since this lake is in Fermanagh and East Donegal it is of course possible that the species should be credited to the former county, but in dealing with these artificial boundaries it is of no consequence to which county it is allocated.

Sphaerium corneum (Linn.)—Numerous examples of the inflated form noted in our previous report were collected. Examples from Lake Namnamurrive measured $7.5 \times 6.4 \times 5$; from L. Sculban $7 \times 6 \times 5$; from Tully Lough $11 \times 9 \times 8$. It is probably a question of environment.

Pisidium.—Through the kindness of Mr. Welch, Major Trevelyan was better equipped in 1911 for taking the small bivalves, and the results show in the lists, most of the loughs yielding two or more species.

Two corrections have to be made in our previous communication. The specimens noted as *Pisidium Steenbuchii* from Lough Tullynasiddagh

(p. 46) and Lough Vearty (p. 47) should in both cases appear as *P. Lilljeborgii*, whilst the latter has to be added to the fauna of L. Roslin (p. 47 last line). *P. Lilljeborgii*, indeed, proved to be very widely distributed throughout the district explored by Major Trevelyan, occurring in no less than twenty-four of the lakes visited. It is an ‘alpine’ form and has been described under the name of *P. Loveni* by Clessin from a Swiss tarn at an altitude of 7,546 feet. In the British Isles it occurs down the west side from the Shetlands to Killarney. *P. pusillum* probably ranks next in abundance. *P. casertanum* was added from several localities, and *P. personatum* was met with in Lough Meenaskeagh. *P. Henslowianum* still remained unrepresented in Major Trevelyan’s gatherings. The species appears to be both local and rare in Ireland.

Beckenham.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Royal Python from Capt. Hall. A Coati, an Alexandrine Parrakeet, and three Pintail Ducks have been received on deposit. The Fish Hatchery, which has been for some time in course of erection, is now nearly complete, and it is hoped that young Rainbow Trout will soon be on view in the ponds.

DUBLIN MICROSCOPICAL CLUB.

FEBRUARY 14. The Club met at Leinster House, A. R. NICHOLS, M.A (President), in the chair.

W. N. ALLEN exhibited a slide, micro-photographs and drawings of an organism which has not yet been identified or its nature determined. The object was found in gum from an apple tree in considerable quantity and is an irregularly rounded body about 1-1000 inch in diameter, with a spiral appendage extending once or twice the diameter of the body in different specimens.

Dr. G. H. PETHYBRIDGE exhibited pure cultures of the potato blight fungus (*Phytophthora infestans*) growing on a medium prepared, according to Clinton’s method, from crushed oats. On this medium the fungus grows luxuriantly, produces abundant conidia and also oogonia (which were exhibited), but up to the present no antheridia have been produced, and consequently the formation of oospores has not been observed. In the United States, Clinton has obtained oogonia, antheridia and oospores of this fungus on the medium named, and the above-mentioned cultures afford a partial corroboration of his work, while it is anticipated that the further investigations which are now in progress may fully do so.

SIR FREDERICK MOORE exhibited hairs from the corolla of *Columnea Oerstediana*. This plant is a native of Costa Rica and has bright red flowers resembling those of *Aeschynanthus*. On the corolla there are

numerous long multicellular hairs, and in the cells are seen peculiar clusters of red grains or plastids. The cell sap is also coloured red.

Professor G. H. CARPENTER showed specimens of a new species of the Collembolan genus *Cryptopygus* from Ben More, Christchurch, New Zealand. The presence of this western Antarctic genus of springtails, hitherto known only from Graham Land and the South Orkney Islands, in the South Island of New Zealand, is of very high geographical interest.

N. COLGAN exhibited for identification living larvae of a marine organism hatched out from egg-clusters which he had taken in a half-tide pool at Bullock Harbour, Dalkey, a fortnight earlier (January 31st). The larvae were subsequently identified by the President as the trochosphere stage of the marine worm *Phyllodoce maculata* which is generally distributed on the Dublin coasts. The egg-clusters varied in size from 7 mm. to 10 mm. in diameter, and consisted of a roughly globular or elliptic mass of clear jelly invested with a cobwebby membrane, the whole taking on a clear green colour from the numerous minute green eggs enclosed. The clusters, which were fairly numerous, were found attached to *Cladophora rupestris* and other small sea-weeds, and the breeding season (January–February) as observed in this Dublin Bay station agrees with that observed by Garstang at Plymouth, while it antedates by fully three months the season given by M'Intosh for Saint Andrew's in his "Monograph of the British Annelids." The larvae shown were very active. They were roughly elliptic with a well-marked central indentation where the girdle of long cilia was placed. In some later stages the larvae became almost dumb-bell shaped by the deepening of the central indentation, and very soon after their emergence from the egg, which occurred within a week of the removal of the egg-mass from the rock pool, a pair of red brown eyes became plainly visible. In the *Annals and Magazine of Natural History*, vol. iv. (4th Series) the larva is very well figured in illustration of a paper by M'Intosh: "On the Early Stages of Development of *Phyllodoce maculata*."

BELFAST NATURALISTS' FIELD CLUB.

MARCH 27.—GEOLOGICAL SECTION.—JAMES ORR in the Chair.—A lecture was given by JAMES STRACHAN on "Beekite or Cycloidal Chalcedony." After referring to the researches of several English and German geologists on the subject, the lecturer gave a summary of his own investigations, in which he showed conclusively that the question of the origin of the Beekite or cycloidal chalcedony was purely a chemical one, involving the following factors:—(1) an organism with a calcareous shell or framework; (2) the presence of organic matter in the latter of a gelatinous or colloid nature; (3) the presence of circulating waters in a porous rock or mud containing much silica. The chalcedony is a chemical crystalline precipitate replacing carbonate of lime (aragonite more frequently than calcite) and formed in the colloid medium of the organic matter of the shell, &c., by osmotic action. The rings around

the central disc of chalcedony represented the periodic movement of the chemical action. This mode of origin has been suggested by Professor Sollas for certain banded flints, but in the case of Beekite Mr. Strachan said he had particular pleasure in announcing its formation as the first mineral growth definitely "confessing its history" as an osmotic periodic growth. The lecture was illustrated by numerous specimens, microscopic slides, photographs and chemical precipitates of opaline silica in gelatine showing the concentric periodic rings produced in the laboratory.

An interesting discussion followed in which Robert Bell, S. Wear, R. May, and the Chairman took part.

APRIL 3.—The concluding lecture of the session to the junior section took place on 3rd April, when JOSEPH MAXWELL, J.P., gave an instructive account of "Pond Life." In the absence of Robert Patterson, M.R.I.A. (chairman of the section), George Donaldson presided. The lecturer commenced by saying that most people had the idea that ponds were full of all kinds of unwholesome and loathsome objects, but he hoped in the course of his address to dispel that idea and to show there were animals and plants living in ponds quite as beautiful and perhaps more interesting than those leading a terrestrial life. The apparatus used for collecting pond life was exhibited and explained, and hints given as to how such apparatus could be easily manufactured at home at a very small cost. By the aid of a large series of lantern-slides Mr. Maxwell described the structure and habits of many pond inhabitants, commencing with the vegetable kingdom, and continuing by treating the animal kingdom in systematic sequence. At the conclusion of his address the lecturer gave a microscopic display, showing many of the objects he had mentioned living. Mr. Maxwell has kindly undertaken to lead an excursion to the Lagan district and show how aquatic animals and plants can best be obtained and prepared for examination.

DUBLIN NATURALISTS' FIELD CLUB.

MARCH 12.—The Club met in the Royal Irish Academy House, R. Ll. Praeger in the Chair. The programme of the meeting consisted of a number of microscopic exhibits and demonstrations.

R. SOUTHERN showed a new Gephyrean belonging to the genus Phasclosoma, dredged in 700 fathoms off the west coast of Ireland. Its more characteristic features were pointed out, especially the peculiar structure of the papillae on the skin, and these were further illustrated by means of transverse sections of the skin.

T. HALLISSY gave a short description of the petrological microscope, and indicated some of the methods by which crystals can be recognised from their behaviour towards polarized light. He showed slides of a typical holo-crystalline rock—microgranite from the Wicklow Gap; also a typical glassy rock—pitchstone from near Barnes Lough, Co. Donegal; and a fine-grained sandstone from the southern slope of Croaghmore, Clare Island.

Miss J. STEPHENS showed preparations of a fresh-water sponge, *Heteromyenia Ryderi*, Potts. One slide had sections of the sponge showing the skeleton-spicules in their natural position ; the other had a preparation of all the different kinds of spicules in the sponge, namely skeleton-spicules and amphidiscs of two forms, the latter being characteristic of the gemmules.

CORK NATURALISTS' FIELD CLUB.

JANUARY 27.—VISIT TO TECHNICAL INSTITUTE.—The winter session of the Club began with a visit by a large party to the new Crawford Municipal Technical Institute, which was formally opened on January 16th. The members were received by the Head Master, John H. Grindley, D.Sc., who conducted them through the various departments of the School. A number of interesting experiments illustrating the germination of seeds, the growth of plants, &c., were shown in the Botanical Laboratory by John Griffin, teacher of botany in the Institute.

FEBRUARY 3.—VISIT TO PUBLIC BUILDINGS.—Another large party assembled on this date to study the geology and architecture of some of the city public buildings ; the former was explained by Professor I. Swain, and the latter by Henry Houchen. The Technical Institute was again visited. This building, the erection of which is mainly due to the generosity of Mr. A. F. Sharman-Crawford, is in the Renaissance style. The spacious entrance hall is adorned by marbles and granites, most of the former being of local origin, including Ballintemple grey, Mitchelstown black and white, and the well-known Cork red from Little Island. Connemara serpentine and Kilkenny black are also used for pilasters. The two fine columns are of Galway granite.

St. Fin Barre's Cathedral was next visited. This fine building is an example of the early French Gothic style, and afforded an opportunity for an interesting comparison between the methods of the English and French Cathedral builders. Excellent examples of Midleton, Fermoy and Little Island red marbles are found lining the walls of the interior. In the transepts and ambulatory the plinth is of Cork red, which enhances the soft blue of the Italian dove marble used in the dado. The white marble chancel screen is panelled with sculptured alabaster, and red and green Irish marbles, lapis lazuli, Egyptian red porphyry, and a green porphyry resembling that of Lambay, is used in the frieze panels.

The party then proceeded to the Court-house, and here the veining of the limestone so beautifully displayed all along the front and in the fine Corinthian columns was shown to be due to the differential weathering of the components of the limestone, the crystalline material of the fossils yielding much more slowly to the action of the atmosphere than the more or less amorphous matrix binding them together.

MARCH 14.—Under the joint auspices of the Cork Literary and Scientific Society and the Naturalists' Field Club, a lecture entitled "From Creeping to Flight," was delivered by Professor G. H. CARPENTER (of Dublin), at the Assembly Rooms to a very large audience. Dr. A. W. Sandford presided. The lecture, which was fully illustrated by special lantern

pictures, included a study of the flight of insects, birds, &c. The structure, &c., of a bird's wing, the difference between a bird's flight and that of a bat, and many other points in connection with animal "conquest of the air" were explained.

MARCH 25.—The Club met in the Lecture Theatre, School of Art, Professor I. Swain (President), in the chair.

Professor M. HARTOG delivered a lecture on "Mechanism and Life." Having described attempts made to explain the phenomena of living beings in terms of the laws of non-living things, the lecturer proceeded to show how this "physico-chemical" view of life fell into disrepute with biologists.

Previous to the lecture a vote of condolence with the relatives of the late Mr. Wm. Miller was passed by the members on the motion of Professor Hartog, seconded by Professor Swain. Mr. Miller was an old and much-respected member of the Club, who possessed a wide knowledge of astronomy, and kept, for considerably more than a quarter of a century, a complete meteorological record for the city.

N O T E S.

BOTANY.

Morchella conica in Donegal.

Mr. W. E. Hart sends a Morell which, by the kindness of Mr. A. D. Cotton, of Kew, has been identified a *Morchella conica*, Pers. The plant was found by Mrs. H. C. Young growing among short grass on sand-hills at Culdaff, Co. Donegal. Over a dozen specimens were seen, occupying a single small area. A fresh specimen sent by Mr. Hart is about two inches high, with a very short stem and long conical pileus. In Ireland the species is on record for the Dublin district only.

Dublin.

R. LLOYD PRAEGER.

ZOOLOGY.

An Early Butterfly.

On March 20th one of my men captured a freshly emerged specimen of *Pieris rapae* flying in my yard here. It had snowed heavily the night before and the wind that morning was bitterly cold, but the sun had come out from the clouds and shone strongly a short time before the butterfly was captured, and this may have led to its emergence. The only other note I have of its emergence so early is in 1887, when one emerged from pupa on March 8th, but I think this was indoors. The present specimen is a female with most beautiful sulphur yellow colouring on the under side of its hinder wings.

Acton Glebe, Poyntzpass.

W. F. JOHNSON.

Migratory Movements of Chaffinches.

Major Barrett-Hamilton's observations on the cross-channel flight of some twenty-three Chaffinches which flew with the steamer towards Fishguard, is of considerable interest, coinciding as it does with the time when Chaffinches began to make their appearance on the Tuskar Rock last autumn. There I collected five of this species, four females and one male, on the 6th October, and on the next day one Chaffinch appeared. Prior to these dates there was not a sign of a Chaffinch on the rock. On October 10th, two, and on October 11th, four were seen, while on the 12th the birds were numerous and remained on the rock all day, many showing signs of exhaustion towards evening : indeed, one was found dead in the morning of this day. Next day—October 13th—many Chaffinches were still about, three being picked up dead, which I secured.

The University, Sheffield.

C. J. PATTEN.

Birds of Skerries, Co. Dublin.

In the *Irish Naturalist*, p. 244, vol. xviii., Mr. W. J. Williams expresses surprise that I did not list the Tree-Sparrow in my paper on "The Ornithology of Skerries, Co. Dublin," (*ante*, pp. 185-202), and thinks I must either have overlooked or failed to identify the species. Certainly not the latter : I know the bird too well, it being a particular pleasure to say that I owe much of my knowledge in this direction to both Mr. W. J. Williams and his much lamented deceased brother, Edward, both of whom repeatedly drew my attention most carefully to this bird's habits and form, now a good many years ago when I resided in Dublin. I feel I must really have overlooked this bird, but the extent is lessened when one considers that my walks all the time I was in Skerries in September, 1908, never took me away from the sea-road, and indeed I spent most of my time on the actual beach. Hence it is quite likely that on several occasions as I passed along the road the Tree-Sparrows were frequenting the hedgerows a little distance inwards, and so were beyond observing range. Nevertheless, I admit I should have been able to include that bird on my list. In regard to Mr. Williams' other criticism, I wish to point out that I did not say that the Wood-Pigeon fed on the undigested droppings (a colloquial term for faeces) of the Herring-Gull but rather on the grain contained in the ejected pellets from the crop of the latter bird. There were many pellets on the flat slabs of rock, and many grains of corn, clean and fresh, contained in each. Why should not the Wood-Pigeon, with its strong predilection for corn, in order to satiate its voracious appetite, adopt this peculiar mode of supplementing its repast ? Probably the visits primarily to the rocks were for salt, a condiment which all pigeons, wild or tame, much relish. But eating salt would not necessarily mean that the birds must abstain from picking the grains of corn when close at hand.

The University, Sheffield.

C. J. PATTEN.

THE RELATION OF THE PRESENT PLANT POPULATION OF THE BRITISH ISLES TO THE GLACIAL EPOCH.

BY R. F. SCHARFF, PH.D., B.SC.

In the December number of the *Irish Naturalist* Mr. Clement Reid reprints the communication he made to the joint sitting of the Botanical and Geological Sections of the British Association meeting at Portsmouth last autumn. Mr. Reid invited discussion at Portsmouth of the views he brought forward, and I had the honour of being among those who were asked to speak. As the time given to each speaker in the discussion was limited to ten minutes, my remarks were naturally very brief. Now that the readers of the *Irish Naturalist* have been in a position to study Mr. Clement Reid's views and meditate upon them, it may be of interest to state more fully my reasons for dissenting from them.

At the very outset Mr. Reid imposed a curious limitation on the speakers. "For this particular discussion," he said, "we have a perfectly definite starting point. We have merely to account for the incoming of our existing flora, after an earlier assemblage had been swept away almost as completely and effectually as the celebrated eruption wiped out the plants of Krakatoa. Any survival of our flowering plants through the Glacial Epoch except in the case of a few arctic and alpine species, was quite impossible."

Thus Mr. Reid does not even deign to notice that there are a few biologists who disbelieve in such a destruction of the pre-Glacial flora as he depicts. He ignores their existence completely. "We know," continues Mr. Reid, "that during the greatest intensity of the cold all Scotland, Ireland, and the greater part of England were buried under ice and snow—except possibly for some higher peaks on which a few arctic species survived." The expression "*we know*" evidently implies that the last statement is a well-ascertained geological fact. On the strength of this assertion at any rate his audience readily believed that any survival

of our flowering plants—except in the case of a few arctic and alpine species—must have been indeed impossible. But are geologists really so unanimous in their opinion that all Scotland and Ireland were buried under snow and ice during the Glacial Epoch ? It has been truly remarked that in all controversies, as time goes on, hypotheses are apt to masquerade as facts. And this is a case in point. The hypothesis of the destructive influence of the Glacial Epoch or Ice Age is regarded by Mr. Reid and his followers as no longer a mere theory, but a well-established fact. Mr. Reid does not tell us that there is any doubt about Ireland having been buried under vast masses of ice and snow during the Ice Age, so that practically all vegetation was wiped out of existence.

And yet only a year before he opened this memorable discussion at the British Association, the same illustrious assembly listened to an eloquent Presidential Address which ought to have had the effect of warning Mr. Reid that his views of the Ice Age are altogether hypothetical. I am alluding to Professor Bonney's address. Professor Bonney was chosen President of the British Association at Sheffield in 1910 on account of his distinguished services in the field of geology. And since he made his reputation principally by his contributions to Glacial geology, surely his opinions are worthy of serious consideration. The main interest in his address lies in the fact that it is devoted to the discussion of the origin of the Glacial deposits.

There are only two theories, according to Professor Bonney, which interpret all the phenomena involved. One asserts that throughout the Glacial Epoch the British Isles generally stood at a level higher than at present, so that the ice which almost buried them flowed out on to the beds of the North and Irish Seas. The boulder-clays represent its moraines. The stratified sand and gravels were deposited in lakes formed by the rivers which were dammed up by the ice-sheets.

The other theory recognises the presence of glaciers in the mountain regions, but maintains that the land, which at the outset was rather above its present level, gradually

sank beneath the sea, till the depth of water over the eastern coast of England was fully 500 feet, and over the western nearly 1,400 feet, from which depression it slowly recovered. After this statement, Professor Bonney dwells on the difficulties involved in accepting either of these two theories, and finally comes to the conclusion that while the objections to the first or land-ice hypothesis are more serious, he cannot as yet declare the other one to be satisfactorily established.

No one who has read Professor Bonney's able address can remain in a moment's doubt that the views represented by Mr. Clement Reid of the nature of the Ice Age are highly hypothetical. Hence the whole of the superstructure of Mr. Reid's theory regarding the origin of the plant population of the British Isles rests on an insecure foundation. If the land-ice hypothesis is only the less probable of two theories, what becomes of Mr. Reid's views of the Glacial climate and the almost total destruction of the flora? If we had only local mountain glaciers and a subsequent submergence instead of a vast mantle of ice and snow, no wholesale destruction of the flora need have taken place. It is conceivable even that under such conditions many pre-Glacial plants could have survived the Ice Age in Ireland, especially so in situations exposed to the influence of the Gulf Stream on the western coasts. If the submergence extended over all the western parts, the plants in low-lying districts no doubt would have been destroyed, whereas they would have had a chance of surviving here and there in the more elevated parts which had then become islands.

To Mr. Reid, however, only one theory is possible, and that is the prevalence during the Ice Age of an arctic climate. It seems to him evident (p. 204) that a temperate flora could not have survived the cold in Ireland. He does not produce any botanical evidence in favour of this belief, but in support of his contention that an arctic climate prevailed over the British Islands, he directs attention to the south of England, where leaves of the dwarf Arctic

Birch and some arctic Mosses had been discovered in alluvial deposits. Here, he says, is evidence of the extreme rigour of climate that the botanist himself must accept as conclusive. And do botanists as a whole really accept the evidence referred to as conclusive? Most plants, no doubt, are trustworthy tests of climate. Yet if we wish to grow arctic or alpine plants in health and vigour, we do not provide them with a low temperature. On the contrary, we find that while they endure the greatest summer heat with little injury, they are mostly destroyed when insufficiently protected against frost. In their native habitats they are sheltered by the winter snow from exposure. Hence it is permissible to argue that these plants may once have lived in countries possessing an equable climate. The fact of their having formerly inhabited the south of England does not necessarily imply that an arctic climate prevailed there. Has Mr. Reid forgotten that one of the most typically arctic plants—the Mountain Avens (*Dryas octopetala*) grows wild in profusion close to sea-level near Galway, the average winter temperature of that part of Ireland being 44°F, or 12° above freezing point? The tough leathery leaves of this plant are exceptionally well suited for preservation. If from some unknown cause this habitat of *Dryas octopetala* were now destroyed, future generations might find the imprints of the characteristic leaves of this plant, possibly without any admixture of other species, in the clay. Some future botanists might then be disposed to argue from this deposit that an arctic climate must have prevailed in Ireland within recent times.

Mr. Reid, however, quotes one more piece of evidence in favour of his contention as to the former extreme rigour of the climate in the south of England. Close to Salisbury, he says, are found in profusion remains of various arctic mammals such as the Reindeer, Musk Ox, Arctic Fox, Lemming, and others. Mr. Reid thus leads us to suppose that in such an assemblage of arctic animal remains we possess clear evidence of the former prevalence of an extremely rigorous climate. This is quite a mistake. These animals are not dependent on a cold climate. The Reindeer,

Arctic Fox, and Lemming at any rate are able to thrive and can be kept in perfect health in southern latitudes if suitable food is offered to them. Almost all southern species on the contrary suffer and even die from cold in the extreme north, no matter what comforts we supply them with in the way of nourishment. I mention this fact because Mr. Reid omits to refer to a most remarkable feature connected with the occurrence of this arctic fauna southward of its present habitat. It is that the remains of arctic species in recent geological deposits occur invariably mixed with those belonging to warm climates. It is so in England and on the Continent. In Ireland it is precisely the same. The Reindeer lived together with the Irish Elk, the Red Deer, Wild Boar, and even with the Hyaena. In the caves near Doneraile, Co. Cork, so successfully explored by Mr. Ussher, the carcases of hundreds of Reindeer had evidently been dragged in by Hyaenas, as the remains of the two species were mixed in the same deposits. In other Irish caves the remains of Lemmings, Arctic Foxes and Reindeer were mingled with those of Wild Cats, Common Foxes and other southern species. If we could use the evidence of these mammalian remains in favour of former climatic conditions, they would tend to point to a warmer period rather than to a colder one. We must also remember that another arctic animal occurs in abundance in the English deposits referred to which has since retreated northward in England, namely the Arctic Hare. And yet this same species or one very nearly related to it, still flourishes in Ireland from sea-level to the highest mountains, indicating that changed climatic conditions were probably not the cause of its disappearance from southern England.

However, having apparently shown to his own satisfaction that both animals and plants were practically wiped out of the British Islands through the effects of the Glacial Epoch, Mr. Reid advances to the next step of his argument, which is: How did the flora come back again after it was all over? After once more reminding us of Krakatoa—a problem which I have dealt with in another paper—he leads us to the culminating point of his theory

that the flora of the British Islands is due to chance introductions of seeds from the continent during thousands of years. He acknowledges that there have been oscillations of level since the Glacial Epoch. He even admits the existence of a land-connection of England with France, but Ireland remained for ever isolated. And of all the evidences in favour of this extraordinary theory, Mr. Reid quotes the one which tells most strongly against his views—namely, the Pyrenean element in our flora. He quite forgets that this element is accompanied by a corresponding fauna. Mr. Reid claims that only plants with small seeds have been able to cross to Cornwall and Ireland from the Continent, those with large seeds being left behind. The sea is not spoken of by Mr. Reid as a transporting agent, presumably because the large seeds ought then to have had a chance to get across. He relies on birds driven by exceptional gales having done the work, also on herds of migrating Bison, Deer and Horses, packs of Wolves, Foxes and Cats. Bison never lived in Ireland. Perhaps they were afraid to trust their lives to the Irish Sea. The rest of the mammals must have boldly swum across, if we are to believe Mr. Reid's theory to be true, and have deposited their loads of seeds safely on the shores of Ireland.

The mammals being unable to gather their supply of Lusitanian seeds in England, the task of transporting them must have fallen entirely on the migrating birds. Now what are the birds Mr. Reid had in his mind that are driven by gales directly from Spain or the Pyrenees across the sea to the west of Ireland? And if there are such birds, what evidence do we possess of their having carried Lusitanian seeds in their plumage or crops? The only careful examination made of birds alighting in a country immediately after a migratory flight across the sea, revealed the fact that they had no seeds adhering to them and that their crops were empty. Is there any Irish botanist moreover who concurs with Mr. Reid in the opinion that the Lusitanian plants in most places are spreading vigorously from certain definite centres to which chance has transported a seed?

From a purely botanical aspect the acceptance of Mr. Reid's theory presents many difficulties. When we try to apply it to the origin of the Irish fauna, even the migratory birds, in whose efficacy as distributing agents Mr. Reid places so much reliance, cannot help us. It is preferable to approach the problem both from a botanical and a zoological point of view. Only in such a manner can important questions of that kind be adequately discussed.

National Museum, Dublin.

IRISH FUNGI.

BY W. B. GROVE, M.A.

A short time ago Mr. J. Adams, of the Royal College of Science, sent me a large series of Fungi (chiefly Uredineae) from various parts of Ireland. Amongst them, I find the following worthy of mention, as being apparently not recorded before for that country. Those marked with a † are apparently new to the British Isles.

UREDINEAE.

- Uromyces ambiguus**, Lév.—On *Allium Scorodoprasum*, near Louisburgh, Co. Mayo.
- U. flectens**, Lag.—On *Trifolium repens*, Antrim.
- U. Loti**, Blytt.—On *Lotus corniculatus*, R. Dodder, Co. Dublin.
- U. Orobi**, Plowr.—On *Lathyrus montanus*, Woodenbridge, and near Kilbride, Co. Wicklow.
- U. Polygoni**, Fckl.—On *Polygonum aviculare*, Magilligan, Co. Derry.
- Puccinia Arenariae**, Winter (= *P. Lychnidearum*, Link).—On *Arenaria trinervia*, Dargle, Co. Wicklow; on *Lychnis diurna*, Bushmills, Co. Antrim; on *Stellaria uliginosa*, Edenderry, King's Co.
- P. Acetosae**, Körn.—On *Rumex Acetosa*, Broughshane, Co. Antrim.
- P. Cirsii**, Lasch.—On *Cirsium pratense*, Ballyquirke Lake, Co. Galway.
- P. Crepidis**, Schröt.—On *Crepis virens*, Antrim.
- P. Celakovskiana**, Bubak.—On *Galium Cruciata*, Botanic Gardens, Glasnevin.
- P. Iridis**, Wallr.—On *Iris foetidissima*, Botanic Gardens, Glasnevin.

Puccinia major, Dietel.—On *Crepis paludosa*, Trim, Co. Meath.

P. Polygona-amphibii, Pers.—On *Polygonum amphibium*, Lough Neagh, Co. Derry, and near Giant's Causeway, Co. Antrim.

P. Valantiae, Pers.—On *Galium saxatile*, Howth Head, Co. Dublin.

† **P. Zopfii**, Winter.—On *Caltha palustris*, R. Dodder, Co. Dublin.

Melampsora Laric-pentandrae, Kleb.—On *Salix pentandra*, Cookstown Junction station, Co. Antrim.

ASCOMYCETES.

Mycosphaerella Rumicis (Desm.)—On *Rumex obtusifolius*, Beauparc, Co. Meath (conidial stage, = *Ovularia obliqua*, Cooke).

PHYCOMYCETES.

Synchytrium aureum, Schröt. (= *S. plantagineum* Sacc.)—On *Plantago lanceolata*, Antrim.

† **S. Succisa**, De B. et Wor.—On *Scabiosa succisa*, Leixlip station, Co. Kildare.

DEUTEROMYCETES.

† **Darluca genistalis**, (Fckl.) Sacc.—On sori of *Uromyces Anthyllidis*, R. Dodder, Co. Dublin.

† **Ascochyta Brassicae**, Thüm.—On cabbage leaf, Antrim.

Septoria Podagrariae, Lasch. (= *S. Aegopodii* Desm.)—On Goutweed Antrim.

Ovularia primulana, Karst.—On Primrose, Ballyquirke Lake, Co. Galway.

Specimens of all these are deposited in the National Herbarium, Dublin.

The University, Birmingham.

NEWS GLEANINGS.

Royal Society's Conversazione.

At the recent May conversazione of the Royal Society, Prof. C. J. Patten, M.D., showed a selection of specimens and photographs illustrating some features in bird migration observed during eight weeks' residence at the Tuskar Rock lighthouse, Co. Wexford. The exhibit demonstrated that birds supposed by some observers not to migrate or only to do so in a very desultory manner, have been found migrating in considerable numbers together.

The Royal Irish Academy.

Naturalists elected into the Royal Irish Academy at the recent Annual Meeting are C. B. Moffat, N. H. Foster, G. P. Farran, A. R. Dwerryhouse, Prof. Gwynne-Vaughan, A. W. Stelfox, and W. B. Wright.

SOME NEW IRISH MYRIAPODS.

BY C. M. SELBIE, B.Sc.

IN 1893 Mr. R. I. Pocock published¹ a paper containing a list of Myriapoda which he had identified from a collection made in Ireland. The list consisted of twenty-two species, ten centipedes and twelve millipedes. In 1895 Prof. Carpenter² added *Scolopendrella immaculata*, Leach, which he had found in Galway, and which has since been taken in Co. Dublin and on Lambay. In 1896 there appeared a paper by H. W. Brölemann³ in which he adds three new species to the list, bringing the total up to twenty-six. He also mentions a millipede of the subgenus *Leptoiulus*, but this almost certainly belongs to the species identified by Pocock as *Julus pilosus*, Newport. In the same paper he gives a description of the large banded centipede *Lithobius variegatus*, Leach.

Since then no other species has been added to the number recorded as occurring in Ireland. Indeed the Myriapoda have been left severely alone. It is not easy to see why this should be so, for though it is true that the group is one of extreme difficulty, that the identification of species depends upon minute structures and obscure points of difference, yet these drawbacks are more than counterbalanced by the rich field for original work offered by them. There is no doubt that in this country many species, new to Ireland or to Great Britain, are yet to be discovered, and perhaps even some new to science. The life history of many of them has still to be worked out, and their habits as regards moulting and nest-building are very imperfectly known.

In examining the Myriapod collections in the National Museum I have discovered specimens of the two following species identified by Prof. Carpenter but not previously recorded.

¹ *Irish Naturalist*, vol. ii., 1893, pp. 309-312.

² *Id.* vol. iv., 1895, p. 256.

³ *Id.* vol. v., 1896, pp. 12-15.

GEOPHILUS TRUNCORUM, Meinert.

This is one of the smallest of the Geophilid centipedes and may be easily identified by the presence of three strong parallel furrows on the ventral plates of the anterior segments.

The single specimen was found at Ballycastle, Co. Antrim, in 1897.

CRASPEDOSOMA RAWLINSII, Leach.

This specimen was taken at Downpatrick in 1895, probably by Mr. R. Welch, who tells me he was collecting there about that time.

It belongs to the family Chordeumidae, the only other member of which found in Ireland is *Atractosoma polydesmoides*, Leach. From this species it may be distinguished by the much feebler development of the keels on the segments, by the distribution of the bristles on the dorsal surface and by the structure of the copulatory feet of the male. It may be separated at once from the Polydesmidae, to which it bears a superficial resemblance, by the possession of thirty instead of twenty body segments, and by the presence of eyes.

Since Leach's time the species *Rawlinsii* has been subdivided. The present specimen appears to belong to the sub-species *genuinum*, Verhoeff.

In addition to these two species, I have identified the following three new to Ireland from the unnamed material in the Museum.

SCHENDYLA NEMORENSIS, Koch.

This species is represented by two specimens, one from Glenveagh, Co. Donegal (July, 1910, Mr. R. Welch), the other from Lambay (1906, Prof. Carpenter).

It is a small and very slender centipede of the Geophilid group. It may be distinguished from any of the other British centipedes, except *S. submarina*, Grube, by the form of the last pair of legs, and the two large coxal pores which are partly covered by the terminal ventral plate.

JULUS TEUTONICUS, Pocock.

A single specimen, found at Delphi, Co. Mayo, in 1897.

This is the largest tailless British millipede, with the exception of *J. londinensis*, which has never been found again since Leach described specimens from the environs of London. His types are in the British Museum, and Pocock has shown¹ that in some respects they differ considerably from the species now called *J. londinensis* by continental writers. For this species he therefore proposed the name *J. teutonicus*, which is thus equivalent to the *J. londinensis* of Verhoeff and others, but different from that of Leach. I have compared this specimen with Verhoeff's types of *J. londinensis* and the two certainly seem to be identical.

It is a large tailless millipede, dark coloured, of about the same size as *J. niger*.

JULUS LIGULIFER, Latzel.

A single specimen from Cavan (July, 1911, Rev. W. F. Johnson).

This is a dark slender species with a sharp caudal process, and has the posterior edges of the segments fringed with fine bristles. It is very closely allied to *J. pilosus*, Newport.

These five new species bring the Irish list up to thirty-one. There are about fifty known in Great Britain, and it is probable that systematic collecting will reveal the presence of nearly the whole of these, and possibly of some that do not occur there. We have already one such species in *Polydesmus gallicus*, Latzel.

National Museum, Dublin.

¹ Ann. Mag. Nat. Hist. (7), vi., p. 206.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include two Baboons, a White-crowned Mangabey, and a Mona Monkey from Dr. Montgomery, an Irish Stoat, eight Redpolls and a Reed Bunting from Mr. W. W. Despard, a Sulphur-crested Cockatoo from the Hon. Lady M'Calmon, and a Demoiselle Crane from the Hon. A. G. S. Canning. Two Patas Monkeys, a Diana Monkey, five Rhesus, a small Macaque, a pair of Ruffed Lemurs, a White-nosed Coati, a Ratel, and a Manchurian Crane have been bought.

The Society has recently lost by death two of the most popular inhabitants of the Monkey House, the male Chimpanzee, "James," who had lived in the gardens for two years, and the White-handed Gibbon.

DUBLIN MICROSCOPICAL CLUB.

MARCH 13.—The Club met at Leinster House.

N. COLGAN exhibited a living specimen of a minute Sea Slug, *Actaeonia Cocksii*, taken in a rock pool at Bullock, on the 2nd March. Along with the animal were shown two of its egg-clusters with the larvae in different stages of development. The more advanced larvae, which were in slow motion within the egg, already showed the eye-spots and the dark pigmentation of the body. This species is of peculiar interest by reason of its abnormal development. Unlike all of its close relations, the Nudibranchs proper, with which, indeed, some authors class it, *Actaeonia* does not in early life pass through the metamorphic condition known as the veliger stage, but assumes while still within the egg envelope a form differing in little but size and the absence of tentacles from that of the adult animal. Pelseneer, who has studied the life history of this species, terms this mode of development *condensation embryogénique* (*Miscell. Biol. Giard, Paris, 1899.*)

A week after exhibition the more advanced larvae emerged from the egg in a perfectly healthy condition.

Dr. G. H. PETHYBRIDGE exhibited the parasitic fungus *Coleosporium Senecionis* (Pers.) Fr., one of the heteroecious rusts requiring two distinct hosts for the completion of its cycle of development. One of these is the Pine, on the needles of which it forms the well-known "bladder rust" formerly known as *Peridermium pini f. acicola* and specimens in spirit of this stage in the life history were exhibited. The other host is a species of *Senecio*, frequently *S. vulgaris*—the Common Groundsel, but in the present instance it was the cultivated Cineraria. Cinerarias are as a rule comparatively free from fungoid diseases, but this Cineraria rust has recently made its appearance in several localities in England (see Chittenden, *Journ. Roy. Hort. Soc.*, vol. 33, 1908, p. 511). The specimen exhibited came from a Dublin garden, and this is the first record of its appearance in Ireland. Chittenden says that the fungus may be prevented from

spreading on the Cineraria by spraying the leaves with rose-red solution of potassium permanganate, and that if this remedy be applied as soon as any sign of the fungus appears, little damage may be feared.

W. F. GUNN exhibited slides of *Hydra fusca* and *Volvox globator* with what is termed the "two colour" method of illumination. This is a modification of the well-known dark-ground illumination, but instead of entirely stopping out the central rays of the cone of light, a coloured disc of gelatine or other transparent substance is centred below the substage condenser, producing a back-ground of any colour suited to the object. Around this disc is placed a circle of another colour, and when the condenser is adjusted to the proper position, the object is brilliantly illuminated with the converging outer rays of one colour upon a background of another contrasting or harmonising colour. With suitable objects the effect is very fine and details of structure are accentuated. It will be seen that many variations of background and illumination can be employed, the only limiting circumstance being the variety of circles and discs available. With some objects a third colour can be obtained by throwing coloured rays from a bull's-eye condenser. The denser portions of the object will then reflect these, while the more transparent portions will be unaffected and will appear coloured with the peripheral rays from the substage condenser only.

APRIL 10.—The Club met at Leinster House, A. R. NICHOLS, M.A. (President), in the chair.

PROF. G. H. CARPENTER showed *Chernes nodosus* (Schr.), a "false Scorpion" new to the Irish fauna. The specimen taken at Downpatrick, had been received from Mr. R. Patterson. In his Synopsis of the British and Irish species of this order, Mr. H. Wallis Kew (*Proc. R. I. Acad.*, xxix. B, 1911), states that *C. nodosus* is widely distributed and common in Britain and expresses the opinion that it will also be found abundantly in Ireland. The specimens shown had been found attached to the legs of flies.

R. SOUTHERN exhibited a specimen of *Priapulus caudatus*, Lam., obtained by digging in the sand of a Zostera bed in Lough Swilly. The chief features of external anatomy were demonstrated and its remarkable bipolar distribution discussed.

BELFAST NATURALISTS' FIELD CLUB.

APRIL 16.—ANNUAL MEETING.—The President (Robert J. Welch, M.R.I.A.) occupied the chair. A. W. Stelfox, Hon. Secretary, read the annual report, which contained the following ;—" Your Committee have pleasure in submitting the forty-ninth annual report. The work accomplished during the past year will be found to compare favourably with that done in former years, yet some branches of natural history remain untouched in our district. In order that the services of fresh workers may be enlisted your Committee have established a junior section, from which it is hoped that many field naturalists may arise in the future. During the year 36 new members were elected, of whom only 27 have

qualified for membership. There have been 6 deaths and 10 resignations, leaving the total membership on 31st March, 1912, at 393. Of these 19 were junior members. At an extraordinary general meeting held on 16th June, 1911, for the purpose of making alterations in the rules of the Club, the admission of junior members at a reduced subscription and without entrance fee was authorised, and the method of nominating and electing members of Committee was changed. The memorial to our late member, Samuel Alexander Stewart, has been completed and erected in the City Cemetery at a total cost of £70 18s. 6d. The average attendance at the summer excursions was but 29. This compares unfavourably with that for the two previous years, when the average attendance was 42 and 53. The Committee would welcome any suggestion whereby these field days could be made more popular. At the conversazione opening the winter session 250 members and friends were present. The winter meetings were held in the Museum, College Square North, as heretofore. F. Balfour Browne represented the Club at the British Association Conference of Delegates held at Portsmouth in September, 1911, and has submitted his report. The Treasurer will lay before you his statement of accounts, which is not so satisfactory as last year. This is accounted for by the fact that the cost of our Proceedings for the previous year was exceptionally large."

The Treasurer (W. H. Phillips) submitted the statement of accounts.

The report of the Botanical Section was read by N. Carrothers, the Geological report by Miss M. K. Andrews, the reports of the Zoological and Junior Sections by J. A. Sidney Stendall, the Librarian's report by S. Wear, and that of the Sub-Committee appointed to adjudicate on collections sent in for the Club prizes was read by Dr. A. R. Dwerryhouse. The reports were adopted.

The following were elected office-bearers for 1912-13;—PRESIDENT—Rev. Canon Lett, M.A., M.R.I.A.; VICE-PRESIDENT—F. Balfour Browne, M.A., F.R.S.E., F.Z.S.; LIBRARIAN—Sylvanus Wear; TREASURER—W. H. Phillips; HON. SECS.—A. W. Stelfox and Margarita D. Mitchell. COMMITTEE—Miss S. Blackwood, Dr. A. R. Dwerryhouse, Robert Bell, W. J. Fennell, W. A. Green, H. L. Orr, Robert Patterson, W. J. C. Tomlinson, and Robert J. Welch.

MAY 4.—GEOLOGICAL SECTION. EXCURSION TO CAVE HILL AND CARR'S GLEN.—A large party of members met at the Belfast Waterworks, and proceeded to the Cave Hill quarry. The Rhaetic clays and Glauconitic Sands at the entrance were first examined, and characteristic fossils obtained from both. In the quarry, the Chloritic Sands and White Limestone also yielded good results. The basalt was examined for zeolites, and in connection with these Mr. Bell showed a fine specimen of phacolite he had found at Killyflew, near Ballymena, its first record from Co. Antrim. Some interesting basic dykes were noted, also a fault at the western end of the quarry, bringing up the "Chloritic Sands." The walk was continued to Carr's Glen, where an outcrop of Lias yielded fossils, including species and teeth of *Diadema lobatum*, Wright; *Ostrea liassica*, Strickel; *Cardinia listeri*, Sow.; *Modiola*

minima, Sow., &c. The first record from Ireland of *Diadema lobatum* was made by Mr. Bell a few years ago, when he discovered its plates, spines and teeth, in the Planorbis zone, in this glen. The Yellow Sandstones were seen higher up the stream, and at the top of the glen the junction or Lias and Glauconitic Sands was observed. Characteristic fossils were obtained from all the stations.

NOTES.

BOTANY.

A Giant Specimen of *Enteromorpha intestinalis*

While staying at Garretstown, near Kinsale, during the Easter recess, I noticed a few long, green filaments of *Enteromorpha intestinalis* in a narrow ditch of clear, running water, about a quarter of a mile from the beach. This little stream drained some fields and ran by the side of the road. The filaments were fixed at one end, and, with one exception, were about eighteen inches in length. One filament had attained the length of eight feet with an average breadth of one inch.

I have frequently seen specimens of *E. intestinalis* up to about four feet in length, but never larger. This growth of *Enteromorpha* was the only example of a marine alga I could find in the whole course of the stream, which, as one would expect, was fairly prolific in fresh-water *Confervae*, *Nasturtium* and *Myosotis*. We are therefore confronted with the problem of the origin of the solitary *Enteromorpha* so far from the sea. The only semblance of an explanation I can offer is that its progenitor or itself was dislodged from a cart-load of seaweed which the local agriculturists use for fertilising their land, and thus found its way into the stream.

J. C. JOHNSON.

University College, Cork.

Peronospora Ficariae at Howth.

On the 10th of May, 1912, specimens of *Ranunculus repens* were obtained at Howth in which the under side of the leaves was covered by a parasitic fungus. This on examination proved to be *Peronospora Ficariae*, Tul., and is an addition to the Irish Flora.

J. ADAMS.

Royal College of Science, Dublin.

ZOOLOGY.

Land and Freshwater Mollusca from Glengariff.

In the *Journal of Conchology* for April (vol. xiii., 1912, pp. 257-9), Staff-Surgeon K. H. Jones records a number of mollusca from the Glengariff district. Among the species found are *Pisidium obtusa'e*, *P. Lilljeborgi*, and *P. Steenbuchi*, all new records for West Cork. Of these *P. Lilljeborgi* has previously been taken in Ireland only in the north-west, and *P. Steenbuchi* not nearer than Co. Clare.

White Wagtails at the Tuskar Rock.

On April 13th I collected a White Wagtail on the Tuskar Rock, and from that date till my departure on April 22nd I obtained many observations on this species. I collected a second bird on April 17th. These dates, on an average, are a fortnight earlier in the season than any heretofore recorded in Ireland. Here we seem to have a key to the situation (I do not yet say a master key), namely, that a large percentage of this species arrives about the south-eastern section and that over a wide area, and then spreads itself. The birds observed for so many years by Mr. Warren at a date a fortnight to three weeks later than my records did not necessarily arrive at the western section of Ireland or even south-western, though, on the other hand, I have no reason to doubt that the migration is more extensive than one might at first sight think. The birds were discovered in the west because Mr. Warren was there; if Mr. Warren had resided on the opposite side he would in all likelihood have discovered this species long ago. I think I am voicing the opinion of the ornithologists of Ireland when I say we have never had a keener observer and more thorough field naturalist than Mr. Warren. Now that the White Wagtail has been recorded from so many divergent points of Ireland, viz., Mayo (Warren), Inistrahull, Donegal (Barrington), Antrim (Patterson), Dublin (Benson and Williams), and Wexford as recorded by me, it is quite evident that this bird has been much overlooked, and has a wider distribution in Ireland on spring migration than was first considered.

C. J. PATTEN.

The University, Sheffield.

The Disappearance of Eagles.

For some years a solitary Eagle has been seen occasionally in Co. Mayo. In spring, 1911, it was last seen in Achill (R. B. Sheridan). On 13th February, 1911, a feather was sent to me from Portacloy, and the bird was again seen in that district in July, in November, and on the 12th February, 1912. The old nests now unoccupied are visible on a cliff called Lugruadh over 700 feet high on the north Mayo coast. In July last I visited Mweelrea Mountain and on asking my guide, a shepherd youth, when the last Eagle was poisoned he said, "last March twelve-months." I learn from several persons that Eagles nested in Curraun Mountain within a few years, but were robbed annually. As to Donegal Mr. W. H. Boyd writes to me ;—"I have seen the head stalker of Glenveagh Forest. He tells me that there were two Eagles there until two years ago and then one disappeared, it was thought through eating poisoned carrion set for foxes. One is still there. They had not bred for many years and were thought to be two females." Mr. M'Lennan, manager at Glenveagh, wrote to the same effect in 1908. He said that a young one had been reared three years previously. Now that Eagles are extinct in Kerry and but one left in Mayo and one in Donegal (their last strongholds), they must be on the point of extinction.

R. J. USSHER.

Cappagh.

REVIEWS.

A HANDBOOK OF GEOLOGY.

The Student's Handbook of Stratigraphical Geology. By A. J. JUKES-BROWNE, F.R.S. 2nd edition. London; E. Stanford, 1912. Price 12s. net.

Whoever possesses himself of this book, and also of "The Building of the British Isles," by the same author, will indeed be well equipped for studying Britannic geology. Mr. Jukes-Browne is an unfailing guide to modern stratigraphical research, and at the same time a wise critic of results. Like most of our prominent schoolmen in geology, he regards our islands as the centre of historic interest. The Karroo Beds do not tempt him; he does not help us to realise the Jurassic reptiles of America, nor the amazing development of mammalia in Eocene times. The last glacial epoch (p. 648) is treated as if it concerned only a portion of Europe, and we are once more invited to consider the diversion of the Gulf Stream, as if this would account for the glaciation of New Zealand or the torrential deposits of the Andes. But the continent of Europe receives far better treatment than is usual, and Ireland, in the author's careful hands, becomes truly one of the British Isles. It is not Mr. Jukes-Browne's fault if he leaves unmentioned two publications of the present year; but we are certain to find near p. 95 of the next edition an account of Messrs. Ryan and Hallissy's new fossils from Bray Head, and near p. 210 a record of Mr. M'Henry's bold suggestion concerning the succession in the Dingle Promontory. In view of their general characters, and of the occurrence of the freshwater Kiltorcan Beds between them and the marine base of the Carboniferous System, the Old Red Sandstone rocks of southern Ireland are not at all likely to be marine. Mr. Jukes-Browne, however, only repeats here (p. 209) the marine view that he has elaborated in his "Building of the British Isles." A general geological map of Ireland is given on pp. 270 and 271, which can easily be coloured by the student. The igneous rocks on this are shaded according to their geological age.

The difficult question of the succession of the rocks in the Scottish highlands seems excellently dealt with, and Mr. Bailey's very recent views on recumbent fold-structure are illustrated (p. 44). The intrusive nature of much of the so-called "fundamental gneiss" in Europe is clearly stated, and the Archaean series of Fennoscandia are described from the publications of the International Geological Congress of 1910. In accordance, however, with the plan laid out in the preface, our great Archaean dominion of Canada is unnoticed.

Though some of us may favour the eclectic method, by which the best evidence for the earth's life-history is gathered from the globe at large, Mr. Jukes-Browne's work is remarkable for the wide reading that it represents. From his home in Devonshire, he watches what geologists are doing throughout Europe, and he does much to bind them together by his sympathetic statement of their views.

The only misprints that we have noticed in this full volume are in proper names; but Three Rock Mountain has wandered into the county of Wexford on p. 634.

A HANDY MAP.

Stanford's Geological Map of Central Europe. London ; E. Stanford, Dec. 1., 1911. Price 5s.

This is a handy map for students, on the scale of 1 inch to 100 miles, and is based on that issued by the International Geological Congress. It extends from Galway to Warsaw, and from Oporto to Corfu, and is partly hand-coloured and partly colour-printed. The unfamiliar but useful term Brioherian is applied to the pre-Cambrian rocks that cannot be classified as schists. The grouping together of Upper Silurian and Devonian strata seems unfortunate, especially for the areas where the Old Red Sandstone type of the latter system prevails. The areas covered by "Pleistocene and Recent" deposits are impressively revealed, and we can even trace where the rivers streaming from the Pyrenees have cut down through the glacial detritus to the Cainozoic beds below. Since East Anglia is properly shown as covered by glacial drift, it might have been well to apply the same scheme of colouring to the Irish plain, as is indeed indicated on the map of the International Geological Congress. The surprising youthfulness of Italy, where Cretaceous limestones are just coming to light among the central gorges of the Apennines, and the antiquity of the plateau of Bohemia, from which the Cretaceous film is being swept away, are among the many features which are contrasted on the map. For a general survey of European structure, its small scale is a distinct advantage.

G. A. J. C.

BRITISH AND IRISH DESMIDIACEAE.

A Monograph of the British Desmidiaceae. By W. WEST and G. S. WEST. Vol. iv, Pp. xvi. + 191, Pl. 96 + 128. London ; Ray Society 1912. Price 25s., net.

This work is continued along the same lines as the previous three volumes published in 1904, 1905, and 1908, respectively. The present volume completes the species of the genus *Cosmarium*, contains all the species of the genera *Xanthidium* and *Arthrodesmus* and the first 41 species of the genus *Staurastrum*, leaving 128 species of that genus for inclusion in the next volume. Altogether 96 species are described in this volume, and of these 64 species—exactly two-thirds—occur in Ireland. The following three species occur in Ireland only ;—*Cosmarium promontorium*, W. & G. West ; *Xanthidium apiculiferum*, West ; and *Arthrodesmus trispinatus*, W. and G. S. West. There are also several varieties confined to Ireland. One species, *Staurastrum disputatum* W. & G. S. West, seems to be an addition to the Irish flora. Five species are mentioned as occurring on Clare Island.

Only one misprint has been detected among the Irish localities, viz., "Derrystrasna" on p. 84 which ought to be "Derrytrasna." As in

previous volumes, every species, variety, and form is illustrated, and needless to say, the plates, many of which are coloured, maintain the same high standard of excellence. There is an additional bibliography bringing the literature down to date.

J. A.

BIRDS AND THEIR WAYS.

The British Bird Book. Edited by F. B. KIRKMAN, B.A., Oxon.
Parts vi. to viii. London and Edinburgh; T. C. and E. C. Jack..

The three parts of the British Bird Book which have appeared since our last notice (September 1911) well maintain, and in some respects surpass, the high standard of their predecessors. There is a nearer approach to unity of plan, and the lumping together of large groups of species in single chapters—as was done with the Finches, for instance, in Part I.—is avoided. The families dealt with are ten—Strigidae, Coraciidae, Upupidae, Alcedinidae, Cuculidae, Columbidae, Pteroclidae, Alcidae, Laridae, and (in part) Limicolae. As might be expected, many of the coloured plates are extremely attractive. A large majority are by the excellent hand of Mr. Seaby, whose views of the Cuckoo uttering its note, Sandwich Terns in a nesting colony, a pair of Red-necked Phalaropes in the courtship season, and a Common Snipe crouching, may be noted as among his most successful performances. There are also some highly animated plates by Mr. Lodge, and Miss Winifred Austen gives a remarkably pretty plumage-study in her adult and immature Rollers, her next best contribution being probably that of the Glaucous Gull.

The principal writers in the part before us are Mr. Pycraft, Mr. Kirkman, the Rev. F. C. Jourdain, and Mr. William Farren. It is of some interest to note that Mr. Pycraft, in his account of the Owls, accepts the occasional luminosity of the Barn-Owl as something established beyond doubt; but the need for further inquiry as to a possible explanation is admitted. Mr. Pycraft's chapters are specially characterised by the amount of attention he gives to nuptial displays and notes. On this subject he has collected a large amount of valuable matter, much of which is admirably presented. Yet there is evidently some risk of readers being misled by these descriptions when they are not absolutely first-hand, and are furnished—as is apparently Mr. Pycraft's practice—by piecing together the evidence of different witnesses. There must often be some uncertainty as to whether two describers are referring to the same or to different phases of the courtship period—whether the note syllabled or described in a particular way by one observer is or is not really different from the note which another observer has syllabled or described in a very different fashion. Mr. Pycraft's descriptions of the nuptial

performances of the Long-eared Owl, the Woodcock, and even the Lapwing, are cases in point—there is room for doubt in all as to whether cries and acts described by different observers have been either wrongly identified or else wrongly differentiated. It is certainly quite at variance with the present reviewer's experience to learn that the "moaning sounds" which are uttered in spring by the male Long-eared Owl are "made, it would seem, on the wing, and accompanied by a strange percussion of the wings brought smartly over the back." In our experience the moaning notes are uttered only while the bird is at rest on a branch, the flight being silent except for the frequently heard wing-claps with which he plays about his haunts.

One of the most interesting of Mr. Kirkman's chapters is that on the Cuckoo, as to whose parasitic habits he, however, declines to commit himself to an explanation. Some space is also devoted to this bird's practice of ejecting one or more of its victim's eggs when placing its own in a nest; and the reason for this act is also regarded as an unsolved puzzle. Here we think Mr. Kirkman has overlooked at least a fairly probable explanation. At the present time the ejection of an egg or two from the nest where the Cuckoo's is deposited may be of little use—though it is, perhaps, not altogether unimportant to the infant Cuckoo to have the laborious task of removing all its foster-brothers and sisters from the nursery somewhat reduced for it in advance, by the removal of a few of them in the egg-stage. But we must remember that the parasitic habit almost certainly originated with Cuckoos whose young had not yet acquired the instinct of ejecting their fellow-nestlings, and would have to be reared along with them, as the young of some foreign Cuckoos are to-day. Under those circumstances would it not be obviously to the advantage of the young Cuckoo that the family with whom it would have to share its rations should not be too large? The parent guarded against the danger by throwing out an egg or two, and retains the habit of doing so—a habit that is even now probably not quite useless—to the present day.

In his chapters on the Razorbill and Guillemot Mr. Kirkman raises several general questions which he ultimately leaves in a spirit of philosophic doubt. On the subject of the extraordinary amount of variation in the colouring of the Guillemot's eggs he, however, falls back on Wallace's explanation that it is due to the simple negative fact of natural selection having here ceased to operate, no special colour being more protective than another on the lofty and many-coloured cliff-ledges along which Guillemots nest. He thus rejects the explanation—favoured in the "Birds of Ireland" by Mr. Ussher—that the varied colours enable each Guillemot to know her own egg. It will be seen that Mr. Kirkman's view implies a belief that natural selection must still be actively at work in checking the tendency to variation in the eggs of nearly all other known species of birds, except the absolutely white. This is to set a very high value on the utility of the colours of eggs in general; and we trust that Mr. Kirkman will return to this deeply interesting question at some other stage of his work.

WRENS ON MIGRATION OBSERVED AT THE
TUSKAR ROCK AND LIGHTHOUSE.

BY PROFESSOR C. J. PATTEN, M.A., M.D., SC.D.

DURING many years, extending from 1881 to 1897, Mr. Barrington, in his "Migration of Birds" (*Analysis of Reports*, p. 90 *et seq.*), records but a solitary example of a Wren as having been taken at the Tuskar, Co. Wexford, the date being October 16th, 1888, and only four examples altogether as having struck the lanterns on the east coast of Ireland, the remaining three being from the Maidens, Co. Antrim. Of these one was obtained on November 19th, 1898, one on May 8th, 1890, and the third on May 12th, 1899. Mr. Barrington then says, "it is remarkable that as many as three of them are from the Antrim coast. This may mean that the Wren chooses the route between Antrim and the S.W. of Scotland as the shortest passage from Ireland to Britain—a selection not unnatural in the case of the shortest winged British Bird." I am bound to say that I think Mr. Barrington has launched his hypothesis in regard to the migration route on insufficient data; there was far too meagre an amount of material obtained. From what I have witnessed at the Tuskar I make bold to say that in all likelihood the Wren passes that rock in as large numbers as any other lighthouse round the east coast of Ireland. I put it down to chance on the part of the lightkeepers' observation more than anything else that the ratio of captures at the Maidens turned out to be 3 to 1 at the Tuskar. The reason why this bird has not been captured in greater numbers at the lantern, I should say, largely depends on the fact that it comes along very quietly, makes little, almost no noise at the glass, and straight away settles down to rest in a recess or on a sash of the window pane. Thus, if the lightkeeper on his watch happens not to be continuously out on the balcony, the bird might remain all through the hours of darkness at the lantern free from observation. When I went up to the lantern to study migration, it was my custom to remain all night out on the balcony. Thus when

Wrens did come along I managed to secure four, one on the night of the 13th of April, and three during the next night. None of these birds *struck* in the strict sense of the word. They came to the lantern glass as softly as would a moth ; indeed a Cockchafer attracts far more attention than a Wren when it comes in contact with the glass.¹

Now the evidence afforded by the presence of a limited number of Wrens at the lantern of a tall tower, such as the Tuskar, which rises up from a rock almost on the sea level, is little or no criterion of the numbers actually on migration. Far greater numbers of this species frequented the rock in the intervening daytime than ever were seen round the lantern at night, thereby affording evidence that the flight of the Wren during migration is relatively low, and so the lantern is avoided. This is very much strengthened by the fact that those Wrens which appeared at the lantern came flying almost perpendicularly up from below, ascending to the glass through the spaces between the balcony railings. I was much interested watching large numbers of Wrens as they crept in and out among the rock crevices during the daytime of April 14th and 15th, and in small numbers on April 16th. I collected six, and could have had more were they needed. The birds had evidently come some distance ; they were tired, very tame, and moved about with their feathers puffed out, a sign in birds of incipient exhaustion from hunger. Of course, there is no doubt that any land-bird which appears on the Tuskar rock, is making a passage. At high water the weather need not assume a marked tempestuous state for the rock to become for the major part wave-swept, and I doubt if there is suitable food, even in fine weather, for insect-feeding birds to sustain life for a longer period than a few days, while fresh water is not available, this precious commodity being carefully conserved for human use. Hence it is that small birds never remain long on the rock, but the Tuskar is an excellent observatory for recording the fleeting visits of migrants made during the daytime.

¹ I wish to thank Mr. Glanville, Principal Keeper, and Mr. Power, Assistant, for ready help in securing me specimens during their hours on watch.

Whether the Wren is a regular annual migrant in spring and autumn is a matter which I must wait and find out for myself. However, at this early stage of my investigations I may mention that on October 4th last I obtained two Wrens from the Tuskar rock, and after I left on October 7th, this species was reported by the lightkeepers on several occasions during the same month. In all I have obtained twelve specimens, and have seen large numbers on certain occasions during eight weeks' residence at the Tuskar, enough and more to afford us good evidence that the main cross-channel route is not of necessity between Antrim and the S.W. of Scotland. The extraordinarily small number of Wrens which Mr. Barrington received, comprising fifteen in number (six of which need not be considered, as they came from breeding stations), during his solicitations *for so many years and from so many lightkeepers*, clearly shows to what an extent the bird has been overlooked at light stations, presuming that my Tuskar records represent ordinary spring and autumn migrations. It is quite true that the creeping Wren, with its sombre plumage, and silent mouse-like movements, easily escapes notice, indeed the eye of a trained ornithologist is often required to detect its presence and whereabouts.

In regard to the power of flight of the Wren, Mr. Barrington expresses surprise that the bird could fly from Britain to the coast of Co. Cork, some 200 miles away, and suggests as a corollary that the specimens taken at the Fastnet may have been blown out of their course during a local migration. Such an analogy certainly has no place in the Tuskar migration indicated in this paper, for the weather was quite calm, and there were far too many Wrens on the move. Besides they showed evidence of having come a distance. Mr. Barrington speaks of the Wren as a species "which might be thought one of the worst adapted for long migratory journeys." I presume that he imposes limitations on the Wren's flight on account of its short wings, because when speaking of the bird selecting the shortest passage from Ireland to Britain, he says—"a selection not unnatural in the case of the shortest winged British bird." But the question of shortness of wing, considered apart

from other factors, when investigating a bird's flying powers, hardly seems a satisfactory measure to go upon. Indeed it is very likely that the shortening of birds' wing is more often than not a secondary or adaptive modification correlated with the mode of life when on the ground, but not necessarily correlated with hindrance of considerable wing-power when need for flight calls such into action. If there were a strict proportional correlation between the shortening of a bird's wings and the limitations of its flight, there is no doubt that in the struggle for existence, unless the other organs of locomotion, such as the legs of the flightless Ratite birds, underwent considerable development, our short-winged birds would have served very badly, if they had not been wiped out *in toto*. It is true that the penguins have become flightless, but only in going through the air ; what power of wing movements they have lost in one medium, they have gained in another, and we find them *flying through the water*, in fact, undertaking vast submarine migrations. Indeed, the penguin moves its limbs almost as a fish when in water and a bird when on land, so perfectly does it command its two environments. It was different in the case of the Great Auk, whose wings became so markedly reduced and enfeebled (not merely by shortening of the flight feathers, but by general reduction), that before these limbs could become metamorphosed into flippers, or some other more useful appendages, to subserve its pronounced aquatic habits, the bird met its fate by total extinction. Lack of compensation for loss of flight is also evident in the case of the Dodo ; had that land-bird developed its legs to a very marked degree for climbing or running purposes, it might have been still living. It seems that in the struggle for existence the one great faculty above all others which birds in temperate lands depend upon is the power of flight, and this is made manifest in migration, which is the rule, not the exception. If in temperate climes a bird cannot hold its own without migrating, it is bound to go to the wall. The abundant, hardy and adaptable House-Sparrow, alike at home in the slum of the city, feeding on its garbage, or by the country farmhouse, helping itself to the choicest

of grain, etc., is one of the few exceptions, and even this species moves about the country in considerable numbers.

To return to the wing-power of the Wren. It is true its flight feathers are short, but if so they are strongly built, as is the whole wing, and we find the same holds good in the case of many other short-winged birds, many which have heavy body-weight to sustain, and yet are excellent fliers when put to the test. It seems to me that what is most important of all, in considering the migratory flight in birds, is their powers of endurance. Long pointed pinions are very useful to sea-birds, endowing them with buoyancy enabling them to slacken their speed as they survey the waters below for food or to indulge in fantastic aerial gyrations. But land-birds, whose food is not at hand and whose environment is totally foreign when crossing the sea, are not possessed of, and can manage to dispense with, such wing-faculties. What is required is the power of flying straight ahead at their accustomed speed, backed by sufficient endurance of wing power to enable them to keep up, and sufficient vitality to enable them to live down the pangs of hunger, thirst, and exposure to adverse weather. Surely the hardy, ubiquitous Wren, a denizen even of the bleakest, almost treeless and wind-swept areas of the country, where it is as much at home as in sheltered woods and glades, must be accredited with such endurance of flight; and as for speed, anyone who watches a Wren dart across an acre of open field will be enabled to estimate for himself what rapid progress could be made in a cross-channel migration by this species. Structurally the Wren is a strongly framed bird and its wing musculature is in no way inferior in development to that of the smaller warblers of somewhat similar body-weight; its reproductive powers are notoriously great, its voice is particularly strong, and altogether physiologically it seems to be a markedly hardy bird.

An interesting feature in connection with the Tuskar migration of Wrens which I witnessed, is that the two birds obtained in autumn proved to be males, while the ten taken in spring are females. I wish I had secured more in the autumn to satisfy myself that there is a tendency for the sexes to keep apart when on migration. The spring

evidence on this point seems well worthy of attention. Another point of interest is that the gizzards of the birds taken at the lantern were quite empty, while those of the birds secured on the rock in the daytime contained, in varying amounts, some insect remains, pointing to the fact that the birds managed to procure something to eat as they perambulated on the rock from daybreak until they were collected.

The University, Sheffield.

REVIEWS.

THE BOVINE FAMILY.

The Ox and its Kindred. By R. LYDEKKER. Pp. 271 (with 55 Illustrations). London ; Methuen & Co., 1912. Price 6s.

That this work should appeal especially to the cattle breeder, as the author imagines, is extremely doubtful. By a careful and conscientious perusal the breeder may possibly obtain some scraps of information which might indirectly be of some benefit to him, but the book is written by a zoologist for his fellow workers. Much of it would be quite incomprehensible to the practical breeder, and the few hints contained in the book are difficult to find owing to the lack of a good index.

Mr. Lydekker deals first with the names of the Ox and its ancestors. He then discusses the structure and zoological position of the Ox. The British domesticated cattle are next described. The author has in this section of the book collected a good deal of scattered information on the subject from previous writers. In the chapter on modern continental cattle and the ancient breeds of the Mediterranean countries, Mr. Lydekker touches on a field of enquiry which should be of interest to the Irish archaeologist, namely the origin of the breed of cattle whose remains have been discovered in the Swiss lake-dwellings. The first to investigate this problem was Professor Rütimeyer, and it has recently been studied in the light of more modern researches by Professor Keller and Dr. Duerst. The conclusions of these studies are that the breed which lived in Switzerland at the time when the ancient lake-dwellings were constructed, is nearly related to the Indian Zebu, and also to the short-horned humped cattle of ancient Egypt.

Now the point of interest as far as the Irish archaeologist is concerned lies in the fact that the cattle as well as the horses of the ancient Irish were closely akin to those found in the Swiss lake-dwellings. We thus seem to be able to trace a migration of certain types of domestic animals of an originally Asiatic stock from the Mediterranean countries, along western Europe ; and this migration must have been accompanied, of course, by a corresponding advance of early human settlers.

R. F. S.

ENTOMOLOGICAL NOTES FROM ULMSTER.

BY REV. W. F. JOHNSON, M.A., F.E.S.

ON December 13th, 1911, Canon Lett sent me a fine male of *Hybernia defoliaria* which he had captured at Aghaderg Glebe, Loughbrickland. It is referable to the variety which Barrett ("British Lepidoptera" vol. vii., p. 233) states occurs in Yorkshire, having the transverse bands on the fore wings very broad and dark coloured. I captured another specimen which flew into the house here on February 20th, but it was of the more typical form as figured by Barrett (*t.c.*, plate 317, figure 1).

On February 27th I received from Mr. H. L. Orr, of Belfast, a female *Phigalia pilosaria* which he had taken in Carr's Glen near Belfast on a lime tree. The moth had laid eggs in the pill box in which she was sent, in two heaps, one at the side of the box and the other in the centre where a pin hole had raised the surface of the cardboard. Among the eggs were fragments of scaly tufts, apparently from her thorax, which was abraded. The eggs were .75 m.m. in length, of a rather blunt oval, very light green in colour, and having the surface rugose in irregular transverse furrows.

On March 9th the eggs had turned brown, and on April 3rd they turned a deep blue-black. The larvae began to emerge on April 5th. They were black, slightly hairy, with white spots at the sides of segments 4-8 and white hinder edges to the same segments, their length 2 mm. On April 14th the larvae showed a greenish tinge on the dorsal surface and were about 10 mm. in length. Now, May 13th, they are 35 mm. in length; the ground colour is blackish brown with lighter mottlings towards the under side. The head is brownish red with two indistinct transverse yellowish bands. Immediately behind the head is a reddish transverse band. The three following segments have black tubercles bearing black bristles, and the centre of the segments is spotted with red; the succeeding segments have also small black tubercles like those on the three first segments, but

on the fourth, fifth, sixth, seventh and eleventh segments there is a raised ridge bearing four large black tubercles on the upper side set transversely, and at their base there are red markings of irregular shape. The spiracles are white surrounded by a black ring, outside which there is a yellowish patch. They are feeding on hawthorn, and when stretched rigid they bear a close resemblance to a bit of dried twig.

On March 17th a neighbour brought me a twig of an apple tree round which was a ring of what, to the naked eye, looked like some furry substance. On examination this proved to be the eggs of *Anisopteryx aescularia*. I put the twig in a small vase of water in my desk and awaited developments. On April 14th the larvae began to emerge, at which time the bud on the twig had burst into leaf. The little larvae were $1\frac{1}{2}$ mm. in length and of a light yellow colour. On April 16th they had developed a greenish patch behind the head and this green colour spread all over the larva. Now, May 13, they are 20 mm. in length, of a much slighter build than the larvae of *P. pilosaria* and without the protuberances so remarkable on them.

The ground colour is light green, white longitudinal dorsal lines and a lateral white line below the spiracles; the spiracles are white on a black ring, and behind each spiracle there is a black patch; from the base of the 1st to the base of the 3rd segment there is a black dorsal patch which is strongest at the front of the 2nd segment. On segments 4-8 inclusive there is a small black dorsal patch at the middle of the front of each segment. There are two rows of minute black spots on each segment; these are not distinct till the last segment, on which they are larger and more numerous and can be seen to bear white bristles. These larvae were fed on apple at first, then on crab-apple and now are feeding on both crab-apple and hawthorn. While the larvae of *P. pilosaria* seem to rely for concealment on their resemblance to a twig, these rely upon their colour, which is exactly that of the fresh leaves, and I found that they took some looking for even in the limited space where they were confined, and where, of course, I knew they must be.

On warm sunny days in April beetles were very active, flying in the warm rays of the sun. I had occasion to go to Jerrettspass on April 13th and 25th, and took the opportunity of walking along the canal bank with my net. Both days were bright and hot, and I netted a few beetles. Among them were *Anchomenus gracilis*, Gyll., *Laccobius sinuatus*, Mots., which was crawling up the rushes and taking flight from the topmost point; *Philonthus nigrita*, Nord.; *P. umbratilis*, Grav.; *Halyzia conglobata*, L.; *Ephuraea parvula*, Sturm. (I am not quite sure of this so give it with reserve); *Aphodius merdarius*, F.; *Donacia sericea*, L., a most beautiful purple form; *Gastroideca polygoni*, L., its first occurrence in this neighbourhood; *Phaedon armoraciac*, L.; *Prasocuris junci*, Brahom; and *Hylesinus fraxini*; Panz., of which this is the first record from Ulster. On *Caltha palustris* were *Hydrothassa marginella*, L., *Prasocuris phellandrii*, L., and *Errihinus acridulus*, L., and on hawthorn *Anthonomus pedicularius*, L.

The little bee *Halictus rubicundus* was much in evidence, its bright red thorax showing strongly. On gorse, which was in glorious bloom, were numerous *Piczodorus lituratus* and I took *Nabis ferus* on the wing.

Acton Glebe, Poyntzpass.

SOME COUNTY DOWN PLANTS.

BY REV. C. H. WADDELL, B.D.

I send notes of some interesting plants, some of which have not hitherto been found in Co. Down. They were collected for the most part last season during excursions of the Belfast Naturalists' Field Club, in May to Killard Point, and in July to Annaghdroghal and Ellis' Cut where the large townland of Kilmore is the only portion of the Co. Down which borders Lough Neagh. Additions to the county flora are marked with an asterisk.

Ranunculus Lingua, L. }
R. circinatus, Sibth. }—In the canal near Ellis' Cut.

Sagina nodosa, Fenzl. var. ?—On the sea-shore between Killough and St. John's Point, August 1897. The variety *moniliformis* Meyer (from *monila*, necklace) was found last season on the Lancashire coast. The joints with whorls of small leaves which fall off grow and renew the plant according to Crépin. It is a dwarf variety. The Killough plants though somewhat larger than specimens I have seen from Lancashire seem to correspond.

Elatine hexandra, DC.—Carrickmannan Lough near Saintfield.

Lathyrus palustris, L.—Mr. Carrothers and I found this in abundance on the marshy shore of Lough Neagh on the Co. Armagh side of the canal, but were unable to find any on the Co. Down side. This plant has not been seen in this locality since Dr. Moore's time. Owing to the great drought we were able to reach portions of the marshes usually quite inaccessible.

* **Cuscuta Epithymum**, Murr.—May, 1911. Growing on Thyme and Lady's Bedstraw on a bank, Killard Point, where it seemed established and not near cultivation.

* **Orobanche rubra**, Sm.—On sandy banks near the sea, Killard Point, May, 1911. This well-known Antrim plant has not hitherto been found in Down. The specimens were smaller than usual and not so bright in colour, nor scented as is usual, but there is little doubt it is *O. rubra*. We only saw two spikes. It grows in a similar habitat in Co. Clare.

Potamogeton heterophyllus, Schreb.—In pools by L. Neagh, Annaghdroghal, Co. Down. The only record hitherto has been "in the river near Ballynahinch, Templeton, 1813," and a ? is put opposite the note in his MS. Journal. This is strange for a not uncommon species.

* **P. Cooperi**, Fryer (*P. crispus* × *perfoliatus*).—August 1897. In shallow water in the Lagan near the whiting works, Magheralin, Co. Down. This hybrid form was found by Mr. Stewart near Templepatrick in the Six-mile Water and was then named *undulatus* Wolf. (*Irish Naturalist*, 1894, p. 125).

* **P. decipiens**, Nolte.—September 1893. Same locality as the above species. The specimen is not a good one, but Mr. A. Bennett who has kindly examined these two plants, says it is "probably this."

Typha angustifolia, L.—In Lough Neagh at the Co. Down side of the canal.

Ceterach officinarum, Willd.—On old walls, Crossgar and Saintfield.

Lastrea aemula, Brack.—On ditch bank, Tonaghmore Hill near Saintfield.

Osmunda regalis, L.—A few plants in Moneygreer bog near Ballygowan; and at Creevy Lough, Saintfield.

Ophioglossum vulgatum, L.—Plentiful in the Saintfield demesne and at Lessans near Saintfield.

Botrychium Lunaria, Sw.—On hills at Rowallane, Saintfield.

Saintfield, Co. Down.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a young female Chimpanzee, a Guinea Baboon, a Green Monkey, and a Lesser White-nosed Monkey from Lieut. R. G. Phillips; a Rhesus Monkey from Mr. J. S. W. Gunning, a Puma from the Earl of Lonsdale, a Meerkat from the Earl of Kingston, a Jackdaw from Miss Donelan, a Grey Crow from Mr. P. Mohan, a Kestrel from Rev. Dr. C. W. Benson, a Sharpe's Wood Owl, a Hawk, and two Grey Parrots from Lieut. R. G. Phillips, five Formosan Teal from Mr. J. Nugent Lentaigne, and two Pheasants from Colonel Claude Cane. A young female Indian Elephant, two Hamadryas Baboons and two Green Monkeys have been purchased. A Wallaby and four Lion cubs have been born in the Gardens. This latest family of young lions consists of two of each sex; the parents are "Red Hugh" and "Maive." Lieut. Phillips' gift of a lively young Chimpanzee is especially welcome after the lamented death of Jennie. Unhappily, the Ape-House now misses another well-known inmate, as the Orang "Bella," died last month.

DUBLIN NATURALISTS' FIELD CLUB.

APRIL 23.—The President (W. F. Gunn) in the chair. F. BALFOUR-BROWNE, M.A., delivered a lecture on "The Natural History of the Dragon Fly." The lecture was largely based on Mr. Balfour-Browne's own researches during the last few years. He described the life-history of the insect from the laying of the eggs to the period of full maturity, and his lecture was illustrated with numerous lantern slides. An interesting discussion ensued, in which the following members took part;—J. N. Halbert, C. B. Moffat, R. Ll. Praeger, and the Rev. G. Waddington, S.J.

MAY 11.—CLANE and CLONGOWES WOOD.—About twenty-seven members and visitors, under the conductorship of Mr. J. De W. Hinch, took part in this excursion. At 12 noon, the party assembled at Kingsbridge and journeyed by the 12.20 p.m. train to Sallins, where cars were waiting to convey the excursionists to the famous limestone quarries of Clane. The quarries having been reached after a short drive, the conductor explained the geology of the district and discussed the conditions under which the Carboniferous Limestone strata were deposited. Mention was made of the fact that here was found the material which enabled Dr. Foord to enrich science by so many additions to our knowledge of the Carboniferous Cephalopoda. Several members of the party then searched for fossils and were rewarded by finding excellent specimens of several species including Spirifer, Euomphalus, Terebratula, Productus, Fenestella, etc. No Cephalopoda, however, were obtained.

Subsequently the party proceeded to Clongowes Wood College, where the members were cordially received by the Rector, the Very Rev. T. V. Nolan, S.J., and generously entertained. After an inspection of the interesting museum collections, buildings, and charming grounds, the party returned to town by the train reaching Kingsbridge at 8 p.m.

N O T E S.

BOTANY.

Irish Plants collected on the International Excursion of 1911.

In the *Irish Naturalist* for November last, Mr. G. C. Druce noticed two plants—*Castalia candida* and *Viola epipsila*, collected by members of the party which visited the south and west of Ireland in the preceding August. In the *New Phytologist* for December last, Mr. Druce discusses fully the floristic results of this excursion, and his paper reappears as an appendix to the Botanical Exchange Club Report for 1911, published last April. In the *New Phytologist* for April last, Dr. C. H. Ostenfield writes on the same subject.

The two Irish plants which bulk largest in these communications are *Castalia candida* and *Viola epipsila*. But the former, recorded positively by Druce, is now withdrawn by Ostenfield (who first drew the members' attention to it in the field); he names the Irish plant instead *C. alba* var. *occidentalis* nov. var. As to the Violet, while Druce treats it as a species, it will appear to conservative botanists rather as a large form of *V. palustris*. I believe I have seen it in several places in Ireland, but I have no specimens. Another "new plant" is *Peplis Portula* var. *dentata* Druce from Killarney, which "forms a passage to the Mediterranean and Western variety *longidenta* J. Gay." Dr. Ostenfield describes as *Erica Praegeri* a new hybrid Heath (*E. Mackayix Tetralix*) from the classical locality of Craigga More. The Heaths of this section are very variable and puzzling, and at present not understood, and the present plant appears rather shadowy. I fancy Carna and Gweedore would yield several new "species" or "hybrids" to the enthusiastic splitter. In Druce's paper will be found a number of Irish records for slight varieties and also for some aliens.

R. L. PRAEGER.

Dublin.

Irish Bird Records.

In the *Zoologist* for November Mr. R. Warren has some notes on the nocturnal habits of the Redwing (*Turdus iliacus*). In the same number Mr. F. C. R. Jourdain, writing on the disappearance of the Osprey in Scotland, opined that this is due to the destruction of this bird on its passage or migration across Ireland. This statement led to a lively discussion in the pages of the Journal named, between Mr. Jourdain, Mr. Warren, Mr. Barrington, and Mr. Harvie-Brown, in which the Irish ornithologists claim that the south-western distribution of the Osprey records from Ireland prove that the Irish Ospreys were not on their way to Scotland at all. In the January number Mr. Warren records a young Glaucous Gull shot in December near Ballina, and in the March number a Common Sandpiper shot in January at Crosshaven.

British Birds for February contains a note by Mr. Ussher on Bernacle Geese on the south coast of Ireland.

GRASSHOPPER-WARBLERS ON MIGRATION
OBSERVED AT THE TUSKAR LIGHTHOUSE.WITH SPECIAL REFERENCE TO THE BEHAVIOUR OF THIS
SPECIES UNDER THE INFLUENCE OF THE
LUMINOUS BEAMS.

BY PROFESSOR C. J. PATTEN, M.A., M.D., SC.D.

"Were it not for its crepuscular and skulking habits the bird would be far better known." The words are Mr. Ussher's, and the quoted sentence is taken from his article on the Grasshopper-Warbler in "The Birds of Ireland," pp. 25 and 26. I make the quotation at the outset because I believe that Mr. Ussher has had considerable personal knowledge of this warbler in its natural habitat. My own experience as far as it goes is quite in accord with that of Mr. Ussher. I believe the bird has been greatly overlooked in Ireland. For reasons which shall be put forward presently I hope to show that we have strong presumptive evidence that this warbler arrives in Ireland in considerable numbers during April and early May. It is very remarkable that its skulking habits are actually practised at such an extraordinarily unusual site as is afforded by the framework of the lighthouse lantern and moreover under the dazzling influence of the luminous beams. These weird habits no doubt have been the means of screening the bird from the eye of the lightkeeper or even on many occasions from the trained eye of the ornithologist. Very shortly after I had commenced making observations on birds at the lighthouse lantern, I was deeply impressed with the different and at the same time characteristic behaviour of various species as they came under the influence of the luminosity of the rays. It would take us too far afield to consider this subject even in quite a general way in regard to various species; in this paper I must confine my remarks to the behaviour of the Grasshopper-Warbler under such conditions. That the bird was a frequent visitor to the lantern during the zenith of its spring migration is seen from the fact that between April 12th and May 4th I collected four

specimens, and for a skulking species this is no criterion of the numbers migrating which escaped notice. I shall now describe briefly the visit of each of the four birds to the lantern and the manner in which they were collected, pointing out also what an easy matter it was, especially under certain adverse meteorological conditions, to overlook the bird completely.

The first time during its vernal migration that I observed this warbler was Friday, April 12th, 1912. When I ascended to the balcony at 9 o'clock p.m., I found the night was dark and cloudy, but overhead some stars were visible up to 10 p.m. After that time the stars grew dim, the night grew blacker, and migrants began to appear in the rays of the lantern. Starlings appeared at 10.15; Wheatears and warblers (the latter larger than Willow-Warblers) at 11 o'clock. The warblers, though fairly numerous in the rays, very seldom came up to the lantern, and when they did so, they, with quivering wings, barely touched the glass, most of them soaring over the dome. Their flight, as it appeared in the path of illumination, was relatively slow and somewhat deliberate, the birds often poising in the air, especially when they drew close to the glass. I was quite unable to make a differential diagnosis of the species to which they belonged, all I could say with conviction was that they were neither Willow-Warblers nor Chiffchaffs, on whose aerial movements at the lantern I had already made considerable observations. I was anxious to secure a few specimens but as the birds neither struck the lantern nor even fluttered on the glass, offering (in the latter case) an opportunity of being "picked off", I gave up the idea of collecting them, and contented myself in watching their beautiful movements as they scintillated in the brilliant beams. I next conceived the idea of starting a series of searches for this skulking species with my hand flash-lamp, examining every nook and recess on the balcony and about the framework of the lantern. After many perambulations I descried a little bird crouching on a hand-ring belonging to a sash of one of the panes of glass of the lantern. I looked at the bird for some minutes and noticed that as

the beams of light in their revolutions illuminated it, and passing by, threw it into utter gloom, the bird all the while skulked. I might have captured it with my hand, but this meant a climb, fraught with danger, and even when I would have reached up to the ring the bird might have slipped away, so I brought to my aid my landing-net, and, securing my specimen, identified it as a Grasshopper Warbler. Here then was a case in which a bird came right up to the lantern without striking, and remained so quiet that unless I had made a special search it would no doubt have escaped observation. This night was calm and the bird found no difficulty in sticking to its scant hiding place, but, as we shall see directly, the weather was not so favourable on the next occasion that I saw Grasshopper-Warbler at the lantern. In regard to the above-mentioned birds which I saw flitting through the rays (other than the Wheatears and Starlings), I may say that I am very strongly of the opinion that they were Grasshopper-Warbler. Of course there may have been some rare species also among them. But it seems unlikely that even the somewhat rarer Irish birds, such as the one under consideration, the Blackcap, Garden-Warbler, Redstart, Whinchat, and others, migrate singly or in couples, but rather in parties, some very likely composed of considerable numbers. Saunders in his "Manual of British Birds" (Second Edition, p. 90), when speaking of the Grasshopper-Warbler says "This species appears to migrate in large parties, for Booth observed several hundreds at daybreak early in May, all congregated on a small patch of some dozen or twenty acres of mud-banks covered with Marsh-samphire and other weeds, near Rye, in Sussex, and evidently making their way inland." I may say that the birds which I saw in the rays and took to be Grasshopper-Warbler, though fairly numerous, did not form large congregations or so called "ruses" which I have seen in the migrations of Willow-Warbler, Wheatears, Skylarks, and some other species.

Eight nights now elapsed before I saw the Grasshopper-Warbler again. On Saturday April 20th at 11.25 p.m., I netted the second specimen in the same way as the first, but with this important difference to be noted, namely,

that the bird when discovered was crouching silently and low at the bottom of a V-shaped recess formed by the meeting of two of the sashes of one of the many lozenge-shaped window-panes of which the lantern is composed. This night was dark, overcast, and misty, the wind was high, and the bird was seeking shelter on the leeward side ; had it alighted on the windward side it could not have procured the refuge. This night I saw many birds (which in all likelihood were Grasshopper-Warbler) vainly attempt to reach the glass, but ere they could do so they were carried off by the wind. Those that struck and fell on the leeward side of the balcony and were secured before being blown away, turned out to be Sedge-Warbler, Willow-Warbler, and Wheatears, but all night long as I walked round the balcony I did not see a Grasshopper-Warbler come in with sufficient speed to "strike," unless when incidentally blown against the glass by the wind. Examples of all species present in the rays met with this disaster, and, as the birds were hurled against the glass, clouds of breast or back feathers flew out, shewing that the victims were entirely at the mercy of the wind, and were not striking head on as they are wont to do on calm nights. A windy night increases the difficulties which are always present in regard to the identification of birds in the rays. On calm nights, however, their characteristic behaviour as they come well up towards the glass can usually be made out, but this is so interfered with by the presence of a strong wind that even when close at hand many species defy identification. Blackcaps were evidently on the move this night, for we found one dead on the rock at dawn next morning.¹

The third Grasshopper-Warbler was obtained the next night, or to be absolutely accurate as regards dates, on the early morning of April 22nd. The night was very dark, the sky overcast and much rain fell. About 1 a.m., April 22nd, a dense fog arose and the fog-explosive was set in action. Whitethroats, Sedge-Warbler, Grasshopper-Warbler, Willow-Warbler, Chiffchaffs, Wheatears, Swallows,

¹ This bird and others picked up at dawn were found on the N. and N.W. side of the rock, having been carried in their fall in that direction by the strong S.S.E. wind.

and Sand-Martins were on the move, and examples of all these species were collected at the lantern. I saw Corncrakes in the rays, and I collected several on the rock next morning. Despite the explosion of the fog-signal every five minutes, which not only produces a terrific report but actually blows to atoms numbers of birds which pass too close to it, the stream of migrants this night was kept steadily up till after dawn. My observations on the balcony were considerably hampered because I had, for safety's sake, to come in just before each shot was fired, but during each interval of five minutes duration I was out again. When I had secured a sufficient number of specimens from those which had either struck or, having come to the glass, had been "picked off" I started my search-light perambulations, and lo! perched on the long arm (or "gib" as the light keepers call it) to the end of which is attached the explosive, I espied a Grasshopper Warbler. I had only about ninety seconds to net my bird before the explosion was made, but I was successful in my attempt, and indeed had I left the Warbler there where it was it would have been blown to pieces by the explosive. The "gib" was not on the leeward side but the wind had abated considerably since last night and so the bird could stick on its perch.

The fourth and last specimen obtained during this year's vernal migration at the Tuskar lighthouse lantern, was sent to me very kindly by Mr. Glanville, principal keeper, after I had returned to Sheffield. He secured it at 1.45 a.m. on May 4th, on a dark hazy night accompanied by a gentle east wind. The bird was not obtained after striking, *i.e.*, it did not forcibly hit the glass and fall stunned on the balcony, but was "picked off" the glass of the lantern immediately on coming in contact with it. With it were sent Sedge-Warblers, Whitethroats, Wheatears and Willow-Warblers. In addition to the foregoing Grasshopper-Warblers obtained on their vernal migration as they immigrated to Ireland, I also procured a Grasshopper-Warbler during the autumnal migration, on the night of September 16th, 1911. It came to the lantern quite slowly and was secured as it fluttered against the glass. Emigrating with this species were the following:—Greater

Whitethroats, Spotted Flycatchers, Willow-Warblers, Chiff-chaffs.

In all then I obtained five Grasshopper-Warblers during my eight weeks' residence at the Tuskar Rock lighthouse, and I feel confident, despite my prolonged nocturnal vigils on the balcony, that even with the aid of a search- or flash-lamp, I let a great many examples of this species pass by unnoticed. If we now refer to Mr. Barrington's "Migration of Birds," (Analysis of Reports, 1881-97, pp. 67, 68), we find that the number of specimens which he received is remarkably small. He states that "the whole number of specimens forwarded within the past fourteen years amounts to nine, of which eight were obtained on spring migration, and one in autumn, and *all occurred in different years except two which struck at the Tuskar, April 14th, 1898.*"¹ When one thinks of the numbers of lightkeepers with whom Mr. Barrington has been in touch, it is at once obvious that this warbler must have escaped observation to a marked degree. But if the behaviour of the Grasshopper Warbler at the lantern, as I have described in five instances is typical of its behaviour under such conditions, then we can readily understand how it was that Mr. Barrington received so few specimens. For, as already pointed out, unless one is incessantly prowling about on the balcony at night, more than one example of this skulking bird might be at the lantern and yet not attract notice. As mentioned in a previous article when dealing with the migration of the Wren at the Tuskar lighthouse and rock,² I reiterate that it is not obligatory for the lightkeeper on watch to spend much of his time out on the balcony. Indeed he has many duties to perform which prevent him going out, and especially for long intervals at a time. In regard to the sex of the five birds which I obtained the following is the result:— No. 1, September 16th, 1911, Female; No. 2, April 12th, 1912, Male; No. 3, April 20th, Male; No. 4, April 22nd, Male; No. 5, May 4th, Female. In all five cases the gizzards were quite empty.

The University, Sheffield.

¹ The italics are mine. I wish to lay emphasis on this point.

Supra, pp. 125-130.

THE AUTUMN MIGRATION OF SWALLOWS AT ROSSLARE HARBOUR.

BY H. F. WITHERBY, F.Z.S., M.B.O.U.

I should have written before with reference to Mr. A. D. Delap's article under this title in the *Irish Naturalist* for April (*supra*, pp. 65-71), but that I have been too busy to put my notes together.

I happened to be staying at Rosslare Strand, 2 or 3 miles north of Mr. Delap's point of observation, from September 10th to October 13th, 1911, and I was watching for migrants every day. The ground I chiefly worked was between Rosslare Strand and the end of Rosslare Point which protects Wexford Harbour. (See Map facing p. 65 *supra*).

Perhaps the easiest way for comparison with Mr. Delap's observations will be to put mine in the same diary form.

September 11. (cf. p. 69). Twenty Swallows and three House-Martins flying quickly southwards along the dunes.

September 12. None seen.

September 13 (cf. p. 69). A good many Swallows (say 50) at intervals all going northwards along Rosslare Point.

September 14. The same as yesterday.

September 15-16. None seen.

September 17. A few Swallows flying northwards along Rosslare Point.

September 18 (cf. p. 69). A very large migration of Swallows (about 80 per cent. young birds) with a few House-Martins and Sand-Martins. Up to 10 a.m. all I saw were flying northwards up the coast, and were in a broad line extending inland and over the sea. At 10 a.m. the northward stream stopped and they passed in a constant stream southwards until 3 p.m., when they ceased. There must have been many thousands, but they were never in a compact formation and they flew low.

September 19 (cf. p. 70). A few Swallows going south.

September 20 (cf. p. 70). A good many Swallows and a few Sand-Martins coasting southwards in the morning but none seen in the afternoon.

September 21-23. None seen.

September 24 (cf. p. 70). A good many Swallows and some Sand-Martins coasting southwards.

September 25. None seen.

September 26. (cf. p. 70). A good many Swallows and a fair number of House-Martins all going southwards.

September 27. None seen.

September 28 (cf. p. 70). At Greenore Point (see Map) a good many Swallows and some Sand-Martins passed southwards during the day at intervals.

September 29-30 and October 1 and 2. A few Swallows each day all going southwards.

October 3 to 8. None seen migrating.

October 9. A few Swallows going southwards.

October 10. None seen.

October 11. Two small flocks of Swallows with two House-Martins passed southwards.

October 12 (cf. p. 71). At Carnsore Point (see Map) two biggish flocks of Swallows, with a few House-Martins amongst them, passed apparently southwards and out over the sea, but it was difficult owing to the trend of the coast to make certain of the exact direction. I had not a compass with me.

October 13. At Greenore Point a big flock of Swallows passed southwards.

It will be seen by comparison that my observations do not tally with those made by Mr. Delap, and it is, I think, impossible to say, without other contemporaneous observations made at different points, what these Swallows were really doing. Owing to its magnitude, there seems some chance that the migration of September 18th may have been noted elsewhere, and if so that may provide a key to the problem. One often sees birds migrating apparently in the wrong direction, and I think this must generally be due to some local condition. My idea at the time was that these Swallows were passing eastwards along the south coast of Ireland, and did not realise that they had turned the "corner," and consequently proceeded northwards until some time after they had passed Wexford Harbour, but this is mere theory without observation from other points. I believe that Professor Patten was at the Tuskar Rock on September 18, and it would be interesting to know what he observed on that date.

NOTES. ON THE INCREASE AND DECREASE
OF SOME MAMMALS, BIRDS AND INSECTS
IN THE COUNTY OF LOUTH
DURING THE LAST FIFTY YEARS.

BY G. H. PENTLAND

Louth is a county of small tillage holdings with a good many small demesnes. There is very little preservation of game and the county is densely populated and full of guns, dogs and cats. My notes are chiefly taken in and about my own place which has about 100 acres of woodland and a small lake of about 3 acres, and is about 3 miles west of Clogher Head.

MAMMALS.

Carlingford Lough and Cooley Point have always been the haunt of many Seals both the Grey and Common kinds, but these animals used to be very local in their habits, and very seldom frequented any other part of the coast. However within the last few years 20 or 30 of them have taken to a patch of rocks about a mile N. of Clogher Head, and I am pretty certain they are increasing in numbers all along the coast. Can anyone say where these Seals breed? I believe the Common Seal breeds in early summer and the Grey Seal in autumn and at those times of the year they are very abundant in the places I have mentioned, but from the nature of the coast and the swarms of fishing boats in these waters, I do not believe they can possibly breed there.

Formerly Badgers were very uncommon in Louth. Mr. Filgate, who has been master of the Louth Hounds for over 50 years, tells me that for many years he hardly ever came across one, except at Crewbawn, a steep dense cover on the banks of the Boyne near Dowth. Now he says they are in almost every cover in the county, and my own experience is the same. About 15 years ago a couple of them appeared at Clogher Head among the rocks on the shore, a safe retreat but a most unlikely place; then they

took to my own woods which are neither very large, very old or very well preserved, and in short they are increasing and flourishing everywhere. It is a most extraordinary circumstance and I am utterly at a loss to account for it.

I believe Otters are increasing also. Within the last couple of years they have twice visited the pond here, which they never did before to my knowledge. It is about 3 acres in extent and full of Rudd and Eels.

Louth, like most of Ireland, has been invaded by Squirrels within the last 15 or 16 years. Many of them have the whole tail cream-coloured, not merely the tip. Is this the case in other places ?

The Hedgehog was very common in my woods till about 15 years ago, when it began to decrease, and is now extinct or so nearly so that I have not seen one for 4 years. Is it possible that the Badgers have killed them off ? At any rate the arrival of the Badger and the departure of the Hedgehog synchronized exactly.

BIRDS.

The Missel Thrush has increased enormously as in other parts of Ireland. It seems very adaptive in its habits. I have found its nest in a hole in a stone gate-pier, and on a sandy bank on Baltray Golf Links. They get very tame and one of them finishes our dog's breakfast very often.

The Goldfinch was formerly common, but is now rare, probably owing to birdcatchers. The House Sparrow is rather local and decreasing in numbers ; e.g., it has entirely disappeared from my place. The Bullfinch is certainly increasing.

I do not think Starlings are more numerous in winter than formerly, but they build with us in numbers now, which was not so before. The Magpie is not nearly so common as formerly, and the Hooded Crow, formerly very common, is now quite rare. The decrease of the Magpie and Hooded Crow is certainly not due to gamekeepers. It may be caused by poison laid by farmers, but I do not think it is. I cannot account for it. The Rook has doubled in numbers in my memory. These birds are egg stealers, and a great nuisance to farmers.

The Kestrel, formerly very common, is now almost rare, why, I know not. The Sparrow-hawk holds its own. The Shoveller, formerly almost unknown, is now one of our commonest and most unsuspicious ducks. The Tufted Duck used formerly to be very common on our pond. We called them "Magpie Widgeon." Now I seldom see them. It is not much use to generalise about ducks and geese as their numbers depend almost entirely on the weather, but I may safely say that there are just as many of them as ever. Sheld-ducks breed no more with us but appear in winter. Shovellers have become very common, and Tufted Ducks comparatively rare. Both these ducks are easier to get at than most of the duck tribe.

The Stock Dove was formerly unknown, but now is not uncommon. The Partridge is nearly extinct, a result due to the operations of Rooks and poachers. The Quail pays us very rare visits now; it was once very common. Corn-crakes are not nearly so common as formerly. Last summer there were more than usual, perhaps on account of the fine season. The Lapwing and Snipe are not nearly so common as formerly. Gulls have changed their habits in several ways. They frequent harbours more than they used to do and are much tamer there. They often feed on grain now. The Black-headed Gulls are all over the fields, especially the meadows in summer, hawking for flies, &c., which was not the case in my boyhood. Their increase is particularly noticeable.

INSECTS.

Ten or twelve years ago we were invaded by *Sirex gigas*. This formidable looking creature increased very fast and soon every fallen silver fir or gate post of that timber was riddled with them. They do not seem to care much for any timbers but silver fir and spruce, the former for choice (though I have watched one laying her eggs in a larch post) and it must be neither too green nor too rotten.

Hard on the heels of the Great Wood Wasp came his enemy. About 4 years ago I got my first specimen of *Rhyssa persuasoria*, the ichneumon fly that preys on the grub of the wood

wasp. Since then it has increased wonderfully but is still not very well known. It is a most remarkable insect. About as long or perhaps longer than the wood-wasp (I am speaking of the females of each), it has the curiously attenuated shape of most of the ichneumon flies and is dark in colouring with two rows of whitish spots on the abdomen, but its chief feature is the enormously long ovipositor, nearly $1\frac{1}{2}$ inches long in a good specimen. It is very curious to see this queer insect at work. It runs over the tree trunk stopping to investigate every crevice with busy antennæ, then when some sense shows it the presence of the wood-wasp's larva, it stands high on its long legs, unsheathes its ovipositor from its two scabbards, and inserts it in the hole the larva has bored. Sometimes the needle-like ovipositor is only inserted a very short distance into the timber, at other times it is inserted by long and laborious efforts to its full length and withdrawn with equal effort. The whole process may take 15 minutes or more if the grub is deep in the timber. The ovipositor has a screw point like an auger, and so has the ovipositor of the wood-wasp, but the latter turns round and round when depositing its egg, while the ichneumon does not, so far as I have seen. Both insects make a curious buzz when flying, that of the wood-wasp like a distant motor car, while that of the ichneumon fly has a metallic rattle that catches the ear at once.

Black Hall, Drogheda.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Marten from Mr. Pierce Mahony; a Brazilian Hangnest from Miss Fletcher; an Alexandrine Parrakeet from Miss O'Grady; a Blackbird from Mr. G. E. Low; a Common Newt from Mr. D. G. Thorn; and 200 White Trout with 400 Trout Fry from Col. Claude Cane. This last-mentioned donation is exceedingly welcome, as it makes a beginning in the work of stocking the newly made fish-ponds, in one of which the young fishes may now be seen gaily disporting themselves.

CORK NATURALISTS' FIELD CLUB.

APRIL 29.—ANNUAL GENERAL MEETING.—THOMAS FARRINGTON, M.A., Vice-President, in the chair. The annual reports of the Hon. Secretary, J. Noonan, and the Hon. Treasurer, W. B. Lacy, were submitted. The former stated that a number of excursions arranged for did not take place owing to weather conditions, the railway strike, and other causes. Attention was directed to the Club library, and satisfaction was expressed at the knowledge that one department of the late William Miller's work in local meteorology—recording the rainfall—would not be allowed to drop, but would in future be carried out at the Technical Institute, where all his records are preserved. Both reports were adopted.

The officers and committee for the next session were elected as follows;—President, Prof. I. Swain; Vice-Presidents, Prof. M. Hartog, T. Farrington, W. Humble Johnson, R. A. Phillips, H. Lund; Hon. Secretary, James Noonan; Hon. Treasurer, Wm. B. Lacy. Committee—Mrs. Brooke-Hughes, Miss M. E. Bergin, J. Scott-Kerr, R. Blair.

MAY 1.—EXCURSION TO GOULDING'S GLEN.—A party, numbering about thirty, assembled at St. Luke's Cross at 3 p.m., and walked to the Glen for the purpose of studying its geology. Prof. I. Swain acted as conductor.

MAY 22.—EXCURSION TO BISHOPSTOWN.—The weather being unpromising, although a fine evening followed, only a small party travelled by 3 p.m. train from Capwell to Bishopstown Station, from which the members walked to Bishopstown House, the residence of Mr. E. Neville. Bishopstown, or Ballynaspig, was the summer residence of the Bishops of Cork and Ross in the eighteenth century, and many experiments in horticulture, pisciculture, acoustics, &c., were carried out in its grounds. Many interesting remains of the period, including the curiously-paved court-yard, the old chapel, fish-pond (once a favourite haunt of Watercress gatherers from Cork), and summer-house were pointed out by Mr. Neville. There is a remarkable echo in the grounds, and some fine specimens of Holly, Spanish Chestnut, and Walnut were noted. Mr. Neville's extensive and well-kept fruit gardens also attracted a deal of attention. The members walked from Bishopstown to the Munster Institute, a school under the Department of Agriculture, for female students. Here they were received by Misses M. Sheedy, M. Laird, and L. Murphy, who entertained them at tea, and afterwards showed them through the various departments of the school. The party then walked back to the city.

JUNE 12.—VISIT TO UNIVERSITY COLLEGE.—A party of thirty-five assembled in the Ethnological Museum to hear the fine and varied collection described in great detail by Sir Bertram C. A. Windle, F.R.S., President of the College. This was the first visit of the Club to the Museum, and was the principal item in the day's programme. The members then proceeded to the Geological Museum, when a case of specimens illustrative

of " Animals co-existent with the Pre-historic Man " was briefly described by Prof. Swain. The Chemical and Physical Laboratories were next visited under the guidance of Professors Swain and Dixon. An adjournment to the President's house followed, when Sir Bertram and Lady Windle entertained the party at afternoon tea. A short visit to the Plant-houses terminated a very enjoyable day's proceedings.

BELFAST NATURALISTS' FIELD CLUB.

MAY 11.—EXCURSION TO GLENOE.—From Glynn Station the party made their way on foot up the shady avenue past the old church. They walked up the gentle slope leading to the glen near Rungill Bridge. Some good collecting was done in this glen, which, being quite hidden from the road, is probably unknown to most people, though it is very much prettier and more attractive than the waterfall at Glenoe itself, which thousands of tourists go to see every year. Some Chalk outcrops gave the geologists occupation. The botanists were in their element, and good finds were recorded. Glenoe was reached at 5 p.m. This was the appointed hour for tea. After tea a short business meeting was held, the ex-president, R. Welch, in the chair. The first business was a vote of condolence and sympathy to the relatives of a late much-esteemed member, the Rev. W. S. Smith, of Antrim. This was moved by Mr. William Gray, who referred to Mr. Smith's many-sided activities and his continued and helpful interest in all natural history subjects and in the work of the Field Club. The vote was passed in silence, the members standing bareheaded. A visit was then paid to the waterfall at Glenoe, and the geologists examined the Chalk quarry on the homeward journey. On the way the old graveyard at Glynn, the ruins of the church, and the quaint headstones were examined with interest. The 7.30 train brought the party back to Belfast after a most enjoyable and profitable afternoon.

JUNE 8.—EXCURSION TO ROWALLANE, SAINTFIELD.—A party numbering eighty-four of the Club's members and visitors went to Rowallane, Saintfield, the demesne of Mr. H. Armytage Moore, J.P., by whose kind permission the members of the party were given the pleasure of inspecting his new rock-garden, where many rare and interesting plants were seen. After visiting the gardens, tea was enjoyed on the lawn, after which a short business meeting was held—F. Balfour Browne, M.A., F.R.S.E., Vice-President, in the chair. Three new members were elected, and before the proceedings terminated votes of thanks were passed to Mr. H. Armytage Moore for his very kind permission in allowing the party to visit his demesne, and to Mr. and Mrs. Watson for their attention and courtesy. The party then proceeded to visit the grounds. Mr. W. H. Phillips was fortunate enough to be able to report the finding of *Asplenium septentrionale*, a fern new to the Irish flora. The excursion was most delightful and successful.

REVIEWS.

SCIENCE FOR MARINERS.

Science of the Sea. An elementary Handbook of Practical Oceanography for Travellers, Sailors, and Yachtsmen. Prepared by the Challenger Society for the Promotion of the study of Oceanography. Edited by G. HERBERT FOWLER, B.A., F.L.S., F.Z.S. Pp. 452, with 217 figures, and 18 charts. London ; John Murray, 1912. Price 6s. net.

In this handy volume the student is provided with an encyclopaedia of marine science. The editor has obtained the help of a number of naturalists who are foremost authorities on the various subjects assigned to them, and the scope and value of the book may be gathered from a survey of the chapters and their writers. Dr. H. R. Mill and Capt. D. Wilson Barker write on the air, dealing with wind, rainfall, temperature, and atmospheric electricity ; Professor H. N. Dickson and Mr. D. J. Matthews on the water, discussing temperature, salinity and currents. Professor J. Stanley Gardiner contributes a chapter on the zoology of the shore, in which he gives hints on tropical shore-collecting, and on the outfit desirable for the marine zoologist at work in foreign waters, and discusses the problems presented by coral reefs and islands. Professor V. H. Blackman and Mrs. A. Weber-van Bone write on the Algae, while Dr. Fowler and Mr. E. T. Browne discuss the fauna of the plankton. Then descending to the depths, we have a chapter on the Sea-floor by Sir John Murray and another on the animals to be found there by Dr. W. T. Calman and Mr. G. P. Farran. In most of these chapters there is not only information as to the facts already known, but practical instruction as to how further research may be carried on. They are followed, however, by several chapters in which the practical work of the oceanographer is prominent—on yacht equipment, by Dr. Fowler and Mr. Stanley W. Kemp, on dredging and trawling by Mr. Kemp and Dr. E. J. Allen, on the preservation of marine organisms by Dr. Allen and Mr. Browne, on logs, notes and labels by Dr. Fowler. Then the vertebrate animals of the sea are specially dealt with in two chapters. Mr. L. W. Byrne, who acknowledges especial help from Mr. E. W. L. Holt, writing on fishes and fishing, and Professor D. Amy W. Thompson on whales, seals, and sea-serpents. Professor Thompson thinks that many of the sea-serpent stories may be explained by observations of gigantic cuttle-fishes, but he believes that some of the records point to an undiscovered something more mysterious, and hints that gigantic zeuglodonts may yet survive in the oceans of our globe. The only important group of animals that appear neglected by the editor is that of the pelagic birds.

We hope that all who take their pleasure on the seas will provide themselves with this volume, and by carrying into effect the good advice of its various authors will widen the bounds of the "Science of the Sea."

A NEW LIST OF BRITISH BIRDS.

A Hand-List of British Birds. By E. HARTERT, F. C. R. JOURDAIN, N. F. TICEHURST, and H. F. WITHERBY. London; Witherby & Co., 1912. Price 7s. 6d., net.

As might have been expected, trinomials are the rule rather than the exception in the "Hand-List of British Birds" which appears under the joint authorship of Messrs. E. Hartert, F. C. R. Jourdain, N. F. Ticehurst, and H. F. Witherby. The authors define it as the second object of their undertaking, but we think it might more appropriately have been styled the first, "to give each bird its correct scientific name in uniformity with the rules of the International Commission on Zoological Nomenclature." It was really desirable that this should be done, since a rigid application of the rules adopted by the Fifth International Zoological Congress involves an almost wholesale departure from the specific names with which British ornithologists have long been familiar, and the importance of possessing such a list as sets the results of the new code clearly before us will be recognised by all. Even those amongst us who may kick most strongly against orders to transfer the long accepted and beautifully appropriate name of *Turdus musicus*, from the Song-Thrush to the Redwing—because Linnaeus, in the muddled description of *Turdus musicus* that he wrote in 1758, used some expressions better adapted to the bird that he afterwards called *T. iliacus* than to the Song-Thrush—will welcome the publication of a Hand-List that saves them from the risk of being misled by minutely scrupulous authors who follow the rules of priority into all its least welcome consequences.

In their preface, the authors speak with some severity of those who hesitate to accept at once every consequence of the authorised International code. We note with some interest, however, that even Mr. Jourdain, who in his capacity as part-author of the Hand-List, is responsible for the statement that *Turdus musicus* is "unassailable" as the true name of the Redwing, is also in his capacity as part-author of the "British Bird-Book" now in course of publication, implicated in the crime of rebellion against this view, inasmuch as the British Song-Thrush is there described under the name of *Turdus musicus clarkei*, and we are told in an Editorial footnote (p. 319) that "to discard *T. musicus* now would only cause confusion, and so defeat the main aim of nomenclature and classification."

The use of trinomials has become so copious as to suggest that the turn of quadrinomials cannot be long delayed. For instance, our Hooded Crow, being represented by other slightly different forms in some of the Mediterranean countries, appears in the Hand-List as a subspecies of *Corvus cornix*, *C. cornix cornix*; while the Carrion Crow, for similar reasons, is set down as a subspecies of *Corvus corone*, *C. corone corone*. Now, as many naturalists doubt whether the Hooded and Carrion Crows are specifically distinct from one another, it follows that those who "lump" them as one species, and who therefore stand in need of trinomials to distinguish them as subspecies, will require a four-named system to

distinguish the further "splits" which have been accorded full sub-specific rank in the present Hand-List.

The bloodhound search for priority has resulted, of course, in a good many changes of generic as well as specific names. *Erithacus* (for the Robin) gives way to *Dandalus*, and *Accentor* (for the Hedge-Sparrows) to *Prunella*, *Chelidon* and *Hirundo* change places, so that the Swallow appears as *Chelidon rustica rustica* and the Martin as *Hirundo urbica urbica*. The Sand-Martin and Swift are respectively *Riparia riparia riparia* and *Apus apus apus*. The Barn Owl figures strangely as *Tyto alba alba*. The Great Northern Diver becomes *Gavia immer*, the generic name of *Colymbus* being found to belong more properly to the Grebes. *Tringa* is transferred from the Stints and Dunlins to the Sandpipers, *Erolia* taking its place and *Totanus* vanishing. In *Megalornis grus grus* we must recognise the Common Crane. Of the changes in specific names perhaps the most regrettable—after the transfer of *Turdus musicus*—is that which transposes the Nightingale into *Luscinia megarhyncha megarhyncha*. One can imagine the language into which Ruskin would have burst. It is refreshing to turn back to the page where a name like *Pastor roseus* stands out in lonely splendour, unchanged, unreduplicated, and untransferred.

Irish naturalists will probably be pleased to find that the Yellow-billed and Black-billed Cuckoos of North America, excluded by the late Mr. Howard Saunders for the British and Irish Lists, are re-admitted as "rare vagrants" by the authors of the Hand-List. On the other hand, the door is banged against both the American Robin and the Purple Martin, which are placed in precisely the same level as the American Goldfinch that was shot on Achill Island in 1894. The Nuthatch seen last year at Malahide by Mr. Williams (*Ir. Nat.*, vol. xx, pp. 95, 115), is also referred to as "no doubt introduced."

C.B.M.

NOTES.

BOTANY.

Matthiola sinuata at Ballyvaughan.

Mrs. Seton, of 13 Clarendon Road, Holland Park, London, sends a specimen of the Sea Stock collected in May at Ballyvaughan, where she has discovered a good colony of this rare plant. She writes:—"The colony grows on the sandhills about $\frac{3}{4}$ mile east of the coastguard station—nine plants are in one circular depression facing inland, and a tenth is by itself some little way off on the sea edge of the sandbank." The Sea Stock is one of the rarest of Irish plants, being with the exception of an unverified Kerry record a century and a half old, confined to Wexford and Clare. Of the two Clare records, one (Dough) has not been verified during a hundred years. In the other (Straw Island off Inishmore) it was last seen (leaves only) by Mr. P. B. O'Kelly in 1894.

Dublin.

R. LLOYD PRAEGER.

Occurrence of *Asplenium septentrionale* in Co. Down.

On the occasion of the Belfast Field Club's excursion on June 8th to Saintfield (*supra*, p. 150), when a visit was paid to the demesne of Rowallane, Mr. W. H. Phillips, our veteran Irish fern-lover, discovered a clump of this fern, unknown as a native of Ireland, on a wall there, near the stables. The occurrence is interesting as a case of natural sowing, but no claim could be based on it for the addition of this species to the indigenous flora of Ireland. Mr. Armytage Moore, the owner of Rowallane, grows many alpine plants, and has a nursery garden close by the place where the fern grows; it is probable that the spores came from specimens imported with foreign plants. The well-known case of *Lastrea rigida* at Townley Hall appears to be a similar instance.

Dublin.

R. LLOYD PRAEGER.

Cybele Hibernica—A Correction.

As I hear from Mr. Colgan that there is no prospect of a new edition of "Cybele Hibernica," may I be permitted to correct an error in that of 1898, where, Index of Authors, p. xxvi., a paper is wrongly attributed to me, "On the Occurrence and Geological Relations of certain Ferns in the County of Donegal.—*Dublin Nat. Hist. Soc. Proc.*, iv., p. 247, 1865"? The actual author of the paper was the late William Harte, C.E., M.R.I.A., long the County Surveyor for the Eastern Division of County Donegal, a trained geologist and an ardent naturalist, who took a particular interest in the study of the Ferns and Mosses. He belonged, I think, to a Munster family.

Kilderry, Londonderry.

W. E. HART.

An Irish Herbalist.

Under the title of "An Irish Pharmacopœia" M. D. Haviland publishes in *Knowledge* for May some notes on vegetable remedies in use in Irish country districts.

South Kerry Plants.

To the *Journal of Botany* for June, Rev. E. G. Marshall contributes a paper on plants of the Dingle peninsula, mainly Saxifrages. Among these he describes as a new hybrid *S. Geum* var. *serrata* × *umbrosa* var. *serratifolia*. It seems doubtful that any Irish botanist who has observed the many and indefinite intermediate forms of the two species in question will be willing to follow the author into such refinements as this.

Leucojum aestivum in West Clare.

Some years ago Mrs. Gloster of Parteen House, Limerick, told me that she had found *Leucojum aestivum* in the Moy stream near Lahinch, west Clare. She knew the plant well, but as she had not kept the specimen, the record was scarcely satisfactory. This year (May, 1912) she has brought me bulbs with fruit from the Annagh River, Miltown Malbay, a stream some miles west of the Moy. She mentions Yellow Flag, Marsh Marigold, the Marsh Lousewort, King-fern, and Bracken as associated plants. Both these streams descend with a strong current from the hills, and reaching the levels near the sea their beds are choked by the silt brought down, so that they form marshes having a very characteristic flora. Such situations are similar to those described on the Continent, though differing from the Irish station recorded by Miss Knowles and Mr. Phillips in their paper read to the Royal Irish Academy, 1910, which are generally estuarine.

R. D. O'BRIEN.

Parteenalax, Limerick.

ZOOLOGY.

Testacella haliotidea in South Kerry.

Miss M. J. Delap of Valencia Island informed me on the 21st May that she had just discovered a specimen of what we may call the snail-slug (*Testacella*) in her garden. She subsequently sent me her capture, which proved to be *Testacella haliotidea*, one of the three species known from Ireland. I thought it was a new record from Co. Kerry, but Mr. A. W. Stelfox, the author of the excellent List of Land and Freshwater Molluscs of Ireland, mentioned to me that it had already been taken in this county (see *Irish Naturalist*, vol. xvii., 1908, p. 22). All the same, I believe this to be the first record in the British Isles of a *Testacella* having been noticed on one of the smaller islands of our geographical area.

It may be argued by some conchologists that since *Testacella* has probably never been discovered in the British Islands in any uncultivated spot, we may assume it to be an introduced genus. But we possess many instances, among the lower animals, of species which had for many years been taken only in cultivated ground and then turned up also in uncultivated places. At any rate, I believe that the Irish *Testacellas* are indigenous to this country. Until we can prove the correctness of the introduction theory it is of great importance to record carefully every capture of this subterranean mollusk.

R. F. SCHARFF.

National Museum, Dublin.

Sandwich Tern at Wexford Bar.

On Monday, 22nd April last, whilst travelling from the Tuskar Rock to Wexford by steam-tug, I had a splendid view of a Sandwich Tern (*Sterna cantiaca*), as it stood perched on a buoy off the south end of Wexford "Bar." I was so near the bird that there was no need to make use of my binoculars to ensure identification; its superior size, black feet, and black beak were quite easily discernible. As in the case of the White Wagtail (*Motacilla alba*) so also in the case of this species we owe a great deal of thanks to Mr. Warren for his many observations from the west coast. If some of our Irish ornithologists would keep a sharp look-out for this tern along the east coast of Ireland, I daresay that it might be found breeding. The diversified low-lying coastland between Wexford and Dublin ought to tempt the Sandwich Tern to breed along this section of Ireland. Wexford is the second county on the east coast in which I can now record the appearance of this tern. On Sunday, September 20th, 1908, I observed two Sandwich Terns at Skerries, Co. Dublin (*Irish Naturalist*, 1909, p. 193).

C. J. PATTEN.

University, Sheffield.

"Birds New to Ireland."

Why does Mr. Barrington introduce the question of variation of wing-measurement in discussing the validity of my supposed Mediterranean Skylark? (*vide Irish Naturalist*, vol. xxi., p. 84). I did not raise the point, and I place no importance upon it. As a matter of fact, the wing-measurement of my strange Lark corresponds about to the average of the Common Skylark. In regard to the light grey plumage I do not consider this, if taken alone, is the most important feature either, and it will interest Mr. Barrington to hear that out of the forty-eight Skylarks which I have obtained from the Tuskar, I have shades varying almost from melanic forms to very light greyish-browns. One bird in particular which I obtained last April, is almost as light as my *A. cantarella*. But it is certainly not *A. cantarella*; it has not the same sort of head or beak. Why does Mr. Barrington not debate the question regarding the stronger upward curve of the lower segment of the beak, which seems to me to be the most distinguishing feature of my *A. cantarella*? I can find nothing like this in my forty-eight Common Skylarks.

C. J. PATTEN.

University, Sheffield.

The Lusitanian Flora and Fauna.

To *Knowledge* for March last, Dr. Scharff contributes an illustrated article "On the Resemblance of the Flora and Fauna of Ireland to that of the Spanish Peninsula."

NOTES ON THE FLORA OF THE BLASKETS.

BY R. LLOYD PRAEGER.

The Blasket Islands, lying off the end of the Dingle promontory, form the most westerly part of Ireland. They represent the continuation of the mountainous ridge—an old pre-Devonian fold—which includes Brandon Mountain, Caherconree, and their associates. The Blaskets consist of six islands, varying in size roughly from 30 to 1,000 acres, and also a number of small rocks. They are mostly high and steep. The Great Blasket, which is by far the largest of the group, forms a ridge like the roof of a house. It is nearly four miles long, and half a mile wide. Two points almost touch the thousand-foot contour-line, and for nearly its whole length its crest rises above 500 feet. The other islands are similar as regards their steep and cliff-bound character, excepting Beginish, which is low and flat.

The flora of this interesting group was explored in 1880 by Mr. R. M. Barrington, under a grant from the Royal Irish Academy. He spent five July days on the task, and with characteristic energy he visited all the islands except Beginish. He found 162 species on the Great Blasket, the remaining islands adding 12 additional species ; making a total of 174. Mr. Barrington's report¹ shows that the flora of the group is meagre, and not remarkable in any way.

In the middle of last June, in company with my wife and Mr. A. W. Stelfox (both of whom I have to thank for much assistance), I spent a few days—three and a half, to be exact—on the Great Blasket ; and I am able in some degree to supplement the list of the flora. Our visit occurred at the end of a two months' drought, which militated against successful botanizing. A couple of hours one evening were spent on Beginish. This is the only island of the group which Mr. Barrington did not visit. He says it is flat and small, and of little interest. The very fact that it is flat and therefore widely different from the rest of the group, made me think it worth visiting ; and I was well

¹ *Proc. R. I. Acad.*, (2) iii., pp. 368-391. 1881.

repaid, as the short time provided six more plants to my list of additions to the Blasket flora, and several others only added during the two preceding days.

As to the general characteristics of the Great Blasket, the steep slopes which prevail everywhere drain off all rain at once, and also expose the ground to the full effect of Atlantic gales. Shelter and wet ground are both wanting ; the only spots offering either are the cavities between the great loose blocks of rock on the northern face, and wet streaks which descend from the few springs on the northern cliffs. The southern slopes are composed mainly of extremely short dry grass, full of *Plantago Coronopus* and *P. maritima*, with extensive colonies of *Pteris Aquilina* where exposure is less. At the time of our visit the whole southern side of the island, excepting the Bracken colonies, was burnt quite brown by the drought. On the northern slopes the grass and *Plantago* give way as one ascends to dry *Calluna*, which occupies much of the high ridge of the island. All the houses and cultivation are situated on the steep butt-end of the island which faces the mainland in a north-easterly direction ; here also is a sandy bay backed by low cliffs topped with blown sand. At the extreme west end of the island, as the ridge narrows and falls towards the ocean, a little plateau covered with *Juncus squarrosus* heath intervenes. Beyond that, *Plantago* sward is replaced by a practically pure *Armeria maritima* association, which gives way to spray-swept rocks with *Armeria*, *Spergularia rupestris*, and *Crithmum*.

The greater part of the Great Blasket, it will be conceived, while full of interest of its own, is wretched ground for a botanist looking for rarities, or for a big list. I believe 90 per cent. of the area could be selected which would not yield one-half of the total flora of the island. The plants must be looked for in certain favoured nooks where exposure or dryness reach a minimum, or where the numerous and destructive sheep cannot penetrate. The spots which supply to some extent one or other of these conditions may be mentioned :—

1. The northern cliffs from Slieveronagh to the two ring-forts. Here the great blocks of fallen rock afford protection,

and the Lady Fern, *Hymenophyllum unilaterale*. *Saxifraga umbrosa*, for instance, grow luxuriantly, and *Oxalis Acetosella*, *Scilla nutans*, &c., occur.

2. The great gully on the northern shore called Foilbeg. Here are a couple of springs, and some shelter; also steep rocks where the sheep do not penetrate. *Valeriana officinalis*, *Spiraea Ulmaria*, *Lychnis Flos-cuculi*, *Scilla nutans*, *Orchis incarnata*, *Ajuga reptans* are characteristic of this place.

3. The flat hollow between the ring-forts and the Signal Tower. There is some depth of peat here, and such plants as the Cotton-grasses, Peplis and Narthecium can survive.

4. The beach below the village, with its sands and sand-topped rocks, yields a few arenicole species.

5. The cultivated area. The non-native flora, which constitutes about 20 per cent. of the flora of the island, is practically confined to this limited area.

As regards Beginish, being low and flat it is much moister than the Great Blasket, and after the arid slopes of the larger island it was delightful to walk over the fresh green springy turf of this little islet. Water evidently lies in many spots here in wet weather, and though the shallow pools and marshy places were dry and dusty, a number of marsh plants gave indication of the usual condition of the place.

The majority of the plants which I found which are additions to the flora of the Blaskets occurred in one or other of the spots enumerated above. These additions are as follows :—

Ranunculus hederaceus L.—In several springs at the east end of the island.

R. acris L.—Northern cliffs, in several spots.

R. bulbosus L.—On the blown sands above the beach.

R. Ficaria L.—Quite abundant, growing in perfectly open places where not facing the sun. Still in flower in mid-June.

***Fumaria pallidiflora** Jord.—In the cultivated land, but much rarer than *F. confusa*.

Cardamine hirsuta L.—Rather frequent. *C. sylvatica*, which alone is recorded by Barrington, was observed only once.

- Cochlearia danica** L.—On several parts of the coast; up to 700 feet on Slieveredenagh.
- C. graenlandica** L.—With the last on Slieveredenagh, and at the west end.
- †**Senebiera Coronopus** Poir.—About the village.
- Viola canina** L.—Slieveredenagh at 700 feet.
- †**Cerastium glomeratum** Thuill.—In several spots at the east end of the island.
- Oxalis Acetosella** L.—Chinks of rocks on Slieveredenagh at 700 feet.
- ***Vicia sativa** L.—Cultivated ground.
- †**V. angustifolia** Roth.—Edges of fields; standing uncertain.
- Spiraea Ulmaria** L.—A good deal in the great gully of Foilbeg.
- Rubus pulcherrimus** Neum.—Rocks and gullies above the strand. The only bramble on the Great Blasket.
- Potentilla procumbens** Sibth.—East end of the island.
- Apium nodiflorum** Reichb. fil.—Plentiful on Beginish.
- Lonicera Periclymenum** L.—Several spots on the southern cliffs.
- Cnicus palustris** Willd.—In several spots; native.
- Glaux maritima** L.—Plentiful on Beginish.
- Samolus Valerandi** L.—Several stations on Great Blasket and Beginish.
- Digitalis purpurea** L.—Plenty of fine specimens on the bracken-covered southern slope south of Slieveredenagh.
- ***Veronica agrestis** L.—In the cultivated area.
- ***V. Tournefortii** C. Gmel.—With the last, abundant.
- ***Stachys arvensis** L.—Cultivated fields.
- Ajuga reptans** L.—Foilbeg.
- ***Polygonum Convolvulus** L.—Cultivated fields.
- Listera cordata** R. Br.—Under the heather on Slieveredenagh, 700—900 feet.
- Orchis incarnata** L.—Fine specimens with rich purple flowers on ledges in Foilbeg, and near the ring-forts, 500—700 feet.
- Narthecium ossifragum** Huds.—In the hollow between the Signal Tower and the ring-forts.
- Juncus acutiflorus** Ehrh.—Damp place near south shore east of Slieveredenagh.
- J. Gerardi** Loisel.—Rocks east of the harbour.
- Eleocharis palustris** R. Br.—Common on Beginish.
- Eriophorum vaginatum** L.—Same station as Narthecium.
- Carex arenaria** L.—Fringing the sand-topped rocks over the strand, and in similar situation, up to 700 feet, along the top of the high cliffs on both the northern and southern shore, where there is no trace of sand. Mr. Barrington records *C. disticha* (which I could not find) as "only on the highest portion of the Great Blasket." Could his plant have been *C. arenaria*?
- C. praecox** Jacq.—On the higher parts of the island, among heather.
- C. extensa** Good. }
C. distans L. } Rocky shore of Beginish, sparingly.
- Psamma arenaria** R. & S.—Frequent along the top of the low sand-topped cliffs over the strand. Also along the dry top of high cliffs on the south shore, where there is no trace of sand.

Molinia caerulea Moench.—Dwarfed along the crest of the island ; luxuriant in some of the northern gullies.

Glyceria fluitans R.Br.—Damp spots on Beginish.

***Lolium italicum** Braun.—Occasional in cultivated ground.

Lastrea Filix-mas Presl.—A single plant by a well, east of the harbour.

Ophioglossum vulgatum L.—A tiny form, rising not an inch above the ground, grew on the grassy summit (593 feet) above the village. It was extraordinarily abundant over a limited area—at least 100 plants to the square foot. Specimens of normal size were abundant on Beginish.

Besides these 46 additions to the Blasket flora, I found, on the Great Blasket, ten out of the twelve plants which Mr. Barrington saw only on other islands of the group, the two remaining absentees being *Lavatera arborea* ("only on Innishnabro and the Tearaght"), and *Suaeda maritima* ("only noticed on the Tearaght rock.")

The following notes refer to species which Mr. Barrington found only in one spot on the Great Blasket, or which he otherwise reports as very rare on the island group :—

Polygala serpyllifolia Weihe.—Frequent.

Lychnis Flos-cuculi L.—Also by springs on the southern cliffs.

Spergularia salina Presl.—Beginish.

S. rupestris Lebel.—Abundant.

Radiola linooides Roth.—Frequent.

Vicia sepium L.—Strand and north cliffs.

Epilobium obscurum Schreb.—Wet places on the north and south cliffs.

Hedera Helix L.—North and south cliffs, ascending to 900 feet.

Peplis Portula L.—Between the Signal Tower and the ring-forts.

***Senecio vulgaris** L.—Now abundant in the cultivated area.

Hypochaeris radicata L.—Frequent on the north and south cliffs.

Taraxacum officinale Web.—Seems native. Great Blasket and Beginish.

Sonchus arvensis L.—On a cliff and on rocky shore ; looks native.

Erythraea Centaureum Pers.—Several places.

Plantago maritima L.—Abundant. Inserted by Barrington in the Blasket list, though not noted by him.

Beta maritima L.—Gullies at north extremity of Great Blasket, and on Illaunbawn adjoining.

Empetrum nigrum L.—Several stations.

***Euphorbia Helioscopia** L.—Now abundant.

***Urtica dioica** L.—Now widely spread, probably by sheep.

Juncus bufonius L.—Common.

Koeleria cristata Pers.—Several stations.

Hymenophyllum unilaterale Bory.—In abundance in many places on the northern cliffs, 500—800 feet.

Asplenium marinum L.—Abundant ; to 700 feet on the cliffs, and at 750 feet on the Signal Tower.

Of the 162 species listed by Mr. Barrington from the Great Blasket,¹ 8 were not seen by me. These were :—

- Lychnis Githago.**—"Among corn; a colonist." Seems absent now—probably on account of the use of purer seed for sowing. This plant is maintained only by frequent re-introduction with cereal seeds.
- Stellaria graminea.**—"Rare; only in one spot." Not seen.
- Rubus discolor.**—"Species supposed to be *R. discolor*, but not determined satisfactorily." The only bramble on the island is *R. pulcherrimus* Neum.
- Lapsana communis.**—"Only near houses." Not seen.
- Veronica serpyllifolia.**—"Looks native." Not seen.
- Scirpus setaceus.**—"Frequent." *S. Savii* alone found.
- Carex disticha.**—"Only on the highest portion of the Great Blasket." See remark under *C. arenaria*, p. 160.
- Bromus mollis.**—"Rare, and possibly introduced." Not seen.

Of these, I think it will be safe to withdraw three, namely *Lychnis Githago*, *Rubus discolor*, and *Carex disticha*, for the present from the Blasket list.

To arrive at a total for the flora of the Blaskets, we must add to Mr. Barrington's list the extra species which I have enumerated, and subtract the three plants just referred to. This will give us a total of 208 for the Great Blasket, and 216 for the whole group of islands.

This is an extraordinarily small total, and is accounted for, as I said before, by the character of the surface, which results in an absence of shelter and of wet ground. If we take the Great Blasket, we may compare it with the Irish islands most nearly approaching it in size, as follows :—

		Area. (sq. m.)	Flora.
Great Blasket, ...	...	1·6	208
Tory, ...	...	1·2	147
Inishturk, ...	...	2·25	327
Lambay, ...	...	.96	322

¹ Including three (*Polygala depressa*, *Plantago maritima*, and *Asplenium marinum*) which are recorded with doubt.

It will be seen that Tory best compares with the Great Blasket as regards the extent of its flora. Tory is also exceedingly bare and wind-swept, and the turf-cutters have destroyed most of the original vegetation-surface ; but it is well supplied with lakes and marshes. Inishturk has a flora half as large again as that of the Great Blasket, owing to its diversified surface, and consequent greater shelter and variety of habitat.

To my mind a very interesting feature of the Blasket flora as compared with that of the other western Irish islands is the replacement of *Senecio aquaticus* as the dominant Ragweed by *S. Jacobaea*. This is a clear indication of the much drier soil conditions prevailing there—a fact also borne out by the occurrence of *Carex arenaria* and *Psamma arenaria* along the cliff-edges, and indeed by the whole facies of the flora.

On the mainland of the Dingle peninsula, when going to and from the Blaskets, one or two plants were noticed which appear worthy of mention.

Lavatera arborea L.—On sea-stacks at Dunquin ; native, I have no doubt.

Orobanche rubra Smith.—Sparingly on dry banks, growing on Thymus, between the quay at Dunquin and Dunmore Head. New to Co. Kerry.

***O. minor** Sutt.—Observed in three stages of naturalization. Between Dingle and Ventry it grew abundantly in clover in a newly laid-down field of meadow hay ; close to the chapel a mile S.W. of Ventry, in a grass field evidently laid down several years, it was still abundant. By the roadside near the fine promontory fort of Dunbeg, in a pasture which did not seem to have been disturbed for ten or perhaps twenty years, it grew sparingly, and the specimens were small. Clover was absent, and the plant was parasitic on *Lotus corniculatus* or *Anthyllis Vulneraria*, or both. It had the appearance in this station of being very near extinction. New to Co. Kerry.

***Matricaria discoidea** DC.—It was quite a relief not to find this invader on the Blaskets. On the mainland I saw it at Castlegregory and abundantly at Deelis. I think still unrecorded from Co. Kerry, but Mr. Stelfox tells me he sent Dr. Scully a note of it from Anascaul two years ago.

ROCK-PIPITS ON MIGRATION, OBSERVED AT THE TUSKAR ROCK.

BY PROFESSOR C. J. PATTEN, M.A., M.D., SC.D.

THE negative evidence which I have obtained in regard to the presence of the Rock-Pipit at the lantern of the Tuskar Lighthouse during my eight weeks' residence there—including both spring and autumn migration seasons—can hardly be taken as an indication that the bird is unduly stationary, or at most a mere desultory and local migrant. For, like its congener the Meadow-Pipit (a markedly migratory species), it very seldom visits the lantern, movements by daylight in both species being much more in evidence.

I may say in passing that of the large number of Meadow-Pipits which I observed and collected at the Tuskar light-station, not one was taken at the lantern, nor have I as yet any positive personal knowledge of a single bird appearing in the rays. I do not intend in this paper to make any further reference to the migrations of the Meadow-Pipit regarding daylight movement, and mention this point merely to show the strong analogous features of migration in two closely-allied species. But, inasmuch as the Rock-Pipit appears less often than, and is easily confounded with, the Meadow-Pipit (especially about rocks on dark, gloomy days), by other than expert ornithologists, it seems likely that the former is often overlooked at light-stations when on its diurnal migrations.

A perusal of Mr. Barrington's "Migration of Birds at Irish Light-Stations," and of Mr. Ussher's "Birds of Ireland," has induced me to draw attention to the supposed featureless migration of the Rock-Pipit, which appears to be wholly based upon the supposed paucity of direct evidence of its migrations in so far as the Irish coast is concerned. But, as we shall see directly, this evidence, when analysed, is far less slender than has been supposed. In his "Migration of Birds,"¹ Mr. Barrington dismisses his account of

¹ Analysis of Reports, 1881-97, p. 102.

this bird's migrations in a few lines. He says : " If this species migrates at all, we have little or no evidence of it from the light-stations. In the second week of October, 1886, two specimens were forwarded which had struck the lanterns on Rathlin O'Birne and Eagle Island West, off the north-west coast. These may have been performing a short migration southward, but no other such instances are known to have occurred, the Rock-Pipits received from light-stations having generally been either shot or sent without data." Now, from what I have already said in regard to the tendency of the Rock-Pipit to travel by day and thereby to avoid the lantern, I cannot see that the value of its migration records should in any way be minimised on the grounds that records have been made, and specimens collected at light-stations mainly in the daytime at sites other than the lantern, always provided that the light-station is such that it could not form a permanent or even seasonal natural habitat where nesting could be accomplished. An example of this kind of light-station is found in the Tuskar Rock, where, as I have mentioned in a previous article on " Wrens on Migration observed at the Tuskar Rock and Lighthouse,"¹ the rock at high water may become almost wave-swept, fresh water is unavailable, and food is so scarce that it could not long sustain life. On the other hand, it is obvious to those of us cognisant with the mode of life of the Rock-Pipit, that its migratory movements require very careful scrutiny. For this littoral passerine species exhibits a strong predilection for rocky coasts whose nature closely simulates the ground of which the small barren wave-swept island-rocks are composed. Indeed, by slightly enlarging such a site, raising it beyond the destructive powers of the waves, and here and there carpeting it with scant soil and marine herbage, this hardy species would be sufficiently provided with accommodation to take up its abode and breed. Hence it is that its occurrences (apart from the question of its striking the lantern, of which we have no records) on the Tearaght, on Arranmore, Samphire Island, Innistrahull, and other such light-

¹ *Irish Naturalist*, vol. xxi., 1912, p. 126.

stations which afford food, drink, and suitable breeding sites, give comparatively little help in fixing the extent of its migrations, as the nature of the ground may induce a halt for a considerable time, perhaps for a season, thereby reducing what might have been a passage of considerable length into a mere local movement. In such places, the real test of migration can be carried out only by a competent observer who can furnish reliable statistics to show a marked increase in numbers at certain periods in such out-lying districts of the coastland. But, as we shall now see, and in addition to the reasons already laid down, the appearance of this Pipit on the Tuskar Rock does indicate migration. For we find that the time of appearance of the birds recorded from the Tuskar by Mr. Barrington in the synthetic part of his book, coincides with those seasons of the year when migration is actively going on. Thus, on March 30th, 1890, six Rock-Pipits are mentioned as appearing on the rock,¹ and, again, on April 17th, 1891, two were seen.²

With regard to the two specimens, one of which struck the lantern of Rathlin O'Birne lighthouse, and the other the lantern of Eagle Island West lighthouse, I think (notwithstanding the fact that these lighthouses are situated on islands quite suitable for the bird to inhabit), that it is more than likely that the birds were making a passage. Whatever "coasting" may take place during the daytime, a feature of migration of which we have but scant knowledge, I am strongly of the opinion that the more serious and protracted journeys are undertaken at night.³ Cogent evidence has come to hand in favour of this view from the results of an exhaustive examination which I have carried out on the digestive tract. Practically every bird which I collected—not only those actually striking the lantern of the Tuskar Lighthouse, but also those found dead on the rock

¹ "Migration of Birds" (*Reports on Migration of Birds*, 1888-1897, p. 155).

² Barrington, *loc. cit.*, p. 224.

³ I do not wish to infer by this that birds do not effect long journeys by day also. On the contrary, many observations which I have recently made suggest to me that they do.

in the morning after a migration-night, which, having struck, had fallen or were blown over the balcony—shewed on dissection an entire absence of food-stuffs in the stomach. This was found to be the case in emigrants as well as in immigrants, thus indicating that the former were probably some time winging their way in the dark without the means of getting food ere they reached the lantern ; on the other hand, the gizzards of various species of emigrants which I collected on the rock during daylight, were full of food, including, in some cases, *seeds and grain* absolutely unobtainable on the rock. It may be advanced that such birds might have been only “ coasting,” but this at the most is but an *a priori* argument, not backed by evidence ; at all events, whether coasting or emigrating, the birds were able, after recently partaking of food, to make their way more rapidly to the rock than they could have done had night overtaken them when crossing the sea. Had the gizzards of Mr. Barrington’s specimens, taken at the lantern, been examined and found empty, the question in favour of migration might have been well-nigh established ; but, even without such an examination I think that these night wanderers were more than likely making other than a mere local migration. I have referred to the specimens observed on the Tuskar Rock and recorded by Mr. Barrington. I now supplement these with my records, pointing out that a number of my observations have been substantiated by the capture of actual specimens. The first observation on this species I made at 7.45 a.m. on September 22nd, on a calm, fine, but somewhat hazy morning. There were about a dozen birds present which arranged themselves in a rather thinly-scattered group. They crept about in nooks and crevices, and only now and again did one or two allow me an uninterrupted view of the entire body. This, coupled with the fact that they were badly lit up, rendered identification a trifle difficult, and for the moment thinking they were a wisp of Meadow-Pipits (a bird uppermost in my mind on account of the frequency with which it visited the rock) I first collected one of the brightest-plumed birds, which did turn out to be a Meadow-Pipit. I selected it with the view of obtaining what I suspected was a particularly pale form,

Not heeding the others, I retired for a short time into my dark-room and on emerging from it I was delighted and very thankful when Mr. O'Leary, one of the light-keepers, handed me another he had just collected from the flock, which, on examination, I found to be a Rock-Pipit. The next day after carefully surveying the rock I failed to find any birds present. On Sunday, September 24th, at 12.40 p.m., I obtained a specimen from two observed ; while twenty minutes afterwards several alighted, all very tame, and looking tired. I collected three others this day and could have had more were they needed. There were fully twenty-four on the rock. The next day they had all disappeared. An interval of four days now elapsed before this species reappeared. On Thursday, September 28th—a fine, bright, cool day—at 12.30 p.m., I observed two, one of which I collected ; the other went off. Again another four days' interval ensued ere the bird turned up. On Monday, October 2nd, I saw many, two of which I collected. The next day they all had departed, but on the day following—Wednesday, October 4th—I saw one, and another (possibly the same bird) on the day following. On October 6th, this bird had disappeared and no Rock-Pipits were present, nor did I notice any on the morning of October 7th, the date of my departure from the Tuskar light-station. In all, then, I collected eight birds and observed a great many, and in every case they were tame and listless as though they had undertaken a journey of considerable length. Now, it is a significant fact that with the single exception of a bird which was seen by Mr. Power, light-keeper, on October 25th, and which disappeared the same day, there have been no records from any one of the four light-keepers of this bird's occurrence throughout the winter and spring, and, indeed, up to the present time (July) as I write this paper. Furthermore, during my sojourn on the rock, from March 21st to April 22nd, 1912, I did not observe a single Rock-Pipit, and I surveyed the rock very carefully for them, and even went so far as to collect, on suspicion, some of the more dusky-shaded Pipits which turned up, but which proved to be Meadow-Pipits. Here then we seem to have had before us quite definite autumnal movements of Rock-Pipits, which,

if we include Mr. Power's record, lasted about a month, viz., from the latter end of September to the latter end of October. My eight specimens were collected between September 22nd and October 2nd, 1911. In support of the view that this species is migratory, we find that Saunders¹ writes : "Along the east coast a migration southwards has been noticed in October." In regard to Mr. Ussher's testimony it seems that he has in a great measure pinned his faith to what Mr. Barrington has put forward, and has adopted his views. Mr. Ussher writes : "I have no evidence of the migration of the Rock-Pipit further than that it becomes more common in winter on the flat part of the coast. The few specimens in Mr. Barrington's collection are from island rocks, where the bird has probably been resident, and it is a significant fact that *none have been sent him from any lightship.*"² In regard to the last remarks, which, for emphasis, I have italicised, it is interesting to note that in his admirable book³ just published, Mr. Eagle Clarke observed this species on the Kentish Knock lightship, situated 21 miles from the nearest land (Margate), where, for a whole month, this ornithologist took up his abode. He writes that "Rock-Pipits, probably moving southwards, came on board on the 23rd September and 12th October during the daytime, and one was captured at the lantern at 6.45 p.m. on 8th October." Had the lightship been close to land, the appearance of this species on the deck as well as at the lantern might by some authorities have been thought to have been of less importance, and the movement might have been put down vaguely as "coasting." As the evidence stands, however, I should think that most observers would agree that it is more likely than not that the birds were effecting a true migration.

In conclusion, I wish to say that I have been unable to incorporate in this paper a report on the examination of the gizzards of the eight Rock-Pipits which I collected on the Tuskar Rock. The reason is that I am writing away from home and have not the dissected material before me. On

¹ *Man. Brit. Birds*, 2nd Edit., 1899, p. 143.

² *Birds of Ireland*, p. 41.

³ *Studies in Bird Migration*, 1912, vol. ii., p. 33.

my return to Sheffield, I hope to send a note to the *Irish Naturalist* as an addendum to this paper. If the gizzards prove to be empty the evidence will be overwhelming that the birds had travelled some distance, and an interesting question will arise as to whether an immigration or an emigration was going on. On the other hand, if the gizzards contain food it may be inferred that an emigratory movement may have been taking place, the birds having procured food *just before leaving* the part of the mainland of Ireland in the vicinity of the Tuskar light-station ; but still we cannot necessarily conclude that the birds had travelled but a short distance, a conclusion much more easily arrived at in the case of grain-feeding birds, e.g., Finches, whose diet is only found on the mainland. But flies and other insects which frequent maritime beaches and rock-islands, and which form the staple food of the Rock-Pipit, could doubtless have been procured as the birds sojourned on the rock ere they were captured. And yet these Pipits may have come some distance. In support of such a view I recall the result of my examination of the gizzards of numbers of Wrens which I procured on the Tuskar Rock, where, it may be remembered, that from the *same phase of migration* (vernal) "the gizzards of the birds taken at the lantern were quite empty, while those of the birds secured on the rock in the day-time contained, in varying amounts, some insect remains, pointing to the fact that the birds managed to procure something to eat as they perambulated on the rock from daybreak until they were collected."¹ Had I secured a few of my Rock-Pipits from the *Tuskar lantern*, I anticipate that their gizzards would also have been empty. Finally, it should be remembered that, like the Wrens, so also the Rock-Pipits which I observed at the Tuskar light-station signified by their presence that a *particular phase of migration* was also taking place, here autumnal, and lasting just a month.

Tuskar Lighthouse,
Co. Wexford.

¹ "Wrens on Migration observed at the Tuskar Rock and Light-house." *Irish Naturalist*, vol. xxi., July, 1912, p. 130.

IRISH OLIGOCHAETS.

BY REV. HILDERIC FRIEND, F.L.S., F.R.M.S.

In a small quantity of earth attached to the roots of a plant, I have found no fewer than eight species of annelids. The soil, amounting to a couple of ounces in weight, came from Acton Glebe, Poyntzpass, through the kindness of the Rev. W. F. Johnson, and I am writing this account of the worms contained therein in the hope that other contributors will send material with a view to the extension of our knowledge of this subject. In another paper will be found further notes respecting this same sample, and I therefore content myself here with a description of the Oligochaets. There were four Lumbricidae or earthworms, and four Enchytraeidae or white worms, one of the latter being apparently new to science.

1. Aporrectodea chlorotica, Savigny.

Is usually known as the Green Worm on account of its colour. It is one of the most sluggish of annelids, and frequently assumes the appearance of a curled-up grub or larva. It is very widely distributed, and has been more than once accused of destroying living plants.

2. Allolobophora caliginosa, Sav.

Is a worm which assumes two forms, known as *turgida* and *trapezoides*, but as the specimen was not adult I am unable to say to which of these forms it belonged. This species may be injurious.

3. Dendrobaena subrubieunda, Eisen.

Is by some authorities identified with the *rubida* of Savigny, but it is better known in England by the name of Gilt-tail, on account of its yellow caudal extremity. It is usually associated with leaf-mould, and in all probability is always above suspicion. I have never had the least evidence that it preys on living tissues, though it revels in decaying vegetable matter.

4. Lumbricus rubellus, Hoffmeister.

Is the Red Worm. It is only half the size of the True Earthworm and its rival the Long Worm (*Allolobophora longa* Ude), and is usually regarded as a friend of the gardener and agriculturalist.

These earthworms average about 3—4 inches in length, and are easily identified by their colour, habit, number of segments, position of girdle and tubercula, and the shape of the head or prostomium.

The Enchytraeids, on the contrary, always require the microscope for their diagnosis and identification. They

seldom exceed an inch in length, and are frequently only 2—4 mm. long. They are distinguished from the larvæ of flies and other lowly creatures by the number of segments, the presence of setae, the arrangement of the internal organs, and other well-known marks. Occasionally it happens, however, that we meet with a specimen which is wanting in setae (or is achaetous) as in the genus *Achaeta*, but even here there are well-defined differences between the Enchytraeid and the larvae which at first sight resemble it so nearly. I have to record four species belonging to three separate genera.

5. *Enchytraeus minimus*, Bretscher.

Has of late come to be well-known. It was first described in 1899, but was not recorded for Ireland till 1907 (*Irish Naturalist*, vol. xvi., p. 72), when Southern placed it among the species found on Lambay, and shewed that Michaelsen was wrong in suggesting its probable identity with *E. argenteus* Mich. (*E. parvulus* Friend). To Southern also we owe figures of the brain, nephridium and dorsal vessel. I cannot, however, agree with Southern (*Contrib. Monograph of British and Irish Oligochaeta*, *Proc. R.I.A.*, vol. xxvii., 1909, p. 157) that *E. minimus* is identical with *E. turicensis*. In England, in any case, I find marked differences between the two species, and I have given a full account of *E. minimus* in *J. R. Micro. Society*, 1911, pp. 730—734, with figures. My reading of the dorsal vessel differs from that of Southern, but it is well-known that all these microscopic creatures are subject to many aberrations. For *E. turicensis* I may refer to *The Naturalist*, August, 1911, p. 293.

6. *Fridericia Michaelseni*, Bretscher.

Southern (*Proc. R.I.A.*, vol. xxvii., p. 163) has a note on this species to which the student interested in details may be referred. The specimens received from Poyntzpass agreed with the Irish and Danish specimens in absence of glands at the opening of the spermathecal duct. During the present year I have found both forms in England, and when the glands are present they form a very striking and unmistakeable character.

7. *Fridericia bisetosa*, Levinsen.

Quite a number of bisetose forms have of late been discovered. When perfectly mature their differences are sufficiently obvious and need occasion no difficulty. But when young it is often impossible to be quite certain to which of the allied species the creature is to be referred. During the past year hundreds of specimens have been submitted to examination, and I conclude that we may safely place this species on record for Ireland. It can readily be distinguished alike from *F. paroniana* Issel, which Southern has already noted (*Proc. R.I.A.*, vol. xxvii., p. 161), *F. magna* Friend (*ib.*, 165, *note*), and *F. diachaeta* Bretscher, which is at present

only known for Nottinghamshire (Friend, in *Annual Report Nottingham Nat. Society* for 1910–11, p. 41).

I come lastly to the description of a curious and interesting annelid belonging to a genus which is destitute of setae, and is altogether of unique value to the systematist. The creatures which are always true to type present no such problems, and afford no similar assistance to the study of evolutionary processes, as do those which may be called abnormal, and the genus *Achaeta* may be regarded as a type of the abnormal inasmuch as it not only possesses no setae, but in some instances is also wanting in those transitional vestiges which are spoken of as setae sacs.

As little is known about *Achaeta* it may be well if we devote a few lines to a historical survey of the genus. It was founded by Vejdovsky in 1877, the type being *Achaeta Eisenii*. The chief characters are the absence of setae, the presence in some species of pear-shaped sacs, the absence of dorsal pores; dorsal unpaired salivary glands, colourless blood, the dorsal vessel arising in front of the girdle, brain convex behind, and spermathecae free from attachment with the intestine.

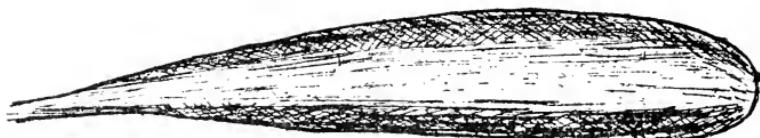
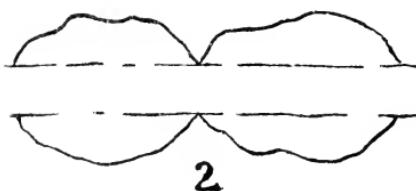
In 1879 Vejdovsky added a second species (*A. bohemica*), in 1899 Cognetti recorded a third (*A. Cameranoi*). There the matter stood in 1900 when "Das Tierreich—Oligochaeta" by Michaelsen was published. In 1902 Bretscher added a further species (*A. Vejdovskyi*), but up till that point, and for five years longer, nothing was known of the *Achaetas* in England, Ireland, Scotland or Wales. To Southern we are indebted for our first introduction to the genus here. He added a new species (*A. minima*) in 1907 (*Irish Naturalist*, vol. xvi. p. 77), and two years later (*P.R.I.A.*, vol. xxvii., p. 165) reported *Achaeta Eiseni* Vejd. for Ireland, and *Achaeta bohemica* Vejd. for Ireland and the Isle of Man.

In 1911 I found *Achaeta Cameranoi* Cognetti near Ashby-de-la-Zouch and *Achaeta bohemica* Vejd. in Kew Gardens and by the side of the canal in the City of Nottingham (*Report Nott. Nat. Socy*, 1910–11, p. 38), and that is as far as our indigenous records go to the end of 1911. The earth from Poyntzpass, however, contained one adult and perfect specimen of *Achaeta* which differs from each and

all of the foregoing in some important points, and must be looked upon as new to science.

8. Achaeta spermatophora, sp. n.

Length about 8 mm. Segments very difficult to count but ranging from 35 to 40. White in the front segments, intestine orange-coloured from about the 9th segment backwards. This colour, however, not due to the chloragogen cells. Setae sacs present dorsally, oval or pear-shaped, absent ventrally, apparently two in each segment. Girdle composed of about 20 rows of glandular cells, the largest being in the middle, those of the fore and hinder parts gradually diminishing in size. Prostomium blunt, rounded. Brain large, nearly oval, convex before and behind, about $1\frac{1}{2}$ —2 x 1. Two pairs of nephridia found in front of the girdle in segments 5/6 and 6/7, as far as I could ascertain from the study



of the living form, which was very difficult to examine. Anteseptal of nephridium about one-third the postseptal, from the posterior of which the short, stout duct emerges (Fig. 1). Nerve in front with wing-like extensions (Fig. 2). The dorsal vessel seems to arise in segment 5, with heart-like pulsings in 5 and 4. The most striking peculiarity, however, consists of a pair of bodies which have all the appearance of spermatophores or sperm-ropes (Fig. 3), which appear to replace the usual spermathecae. It was impossible to say, from the study of the living worm, whether these organs were attached to the intestine or the body wall. They extend from about 4/5 (where the spermathecae usually open externally) to the 8th segment and are clearly the counterparts of those bodies. Hence the specific name.

Found in earth at root of Primula at Acton Glebe, Poyntzpass, Co. Armagh, sent by Rev. W. F. and Mrs. Johnson, May 7th, 1912.

Swadlincote, Burton-on-Trent.

ON THE SUPERFICIAL DEPOSITS OF THE COUNTY OF WEXFORD.

BY T. HALLISSY, B.A., M.R.I.A.

(Contributed with the permission of the Director of the Geological Survey of Ireland.)

THE country to the east of the Leinster Chain is overspread with certain varieties of loose superficial deposits, concerning which much uncertainty prevails with regard to their origin and to their stratigraphical relations to one another. These deposits are best developed on the Wicklow and Wexford coasts, extending from Arklow to Kilmore and spreading from the coast inland as far as Ferns, Gorey, and Enniscorthy. During an investigation of the soils of the Wexford district for the Geological Survey, the writer was afforded an opportunity of studying these deposits, and he is preparing a paper, in association with the Director of the Survey, dealing with their character and origin. In the present note, it is proposed to discuss briefly the nature of the deposits, and to give the conclusions, as regards their geological history, that have been arrived at as a result of the recent investigation.

In the area referred to, three different varieties of loose superficial deposit can be recognised: The first variety, a highly calcareous chocolate-coloured clay or "marl," known as the "Wexford marl," occurs practically over the whole district up to between the 200 and 300-foot contour line. This marl contains numerous arctic and other shells, jasper, coal, chalk-flints, rounded pebbles of chalk, sandstone, diorite, felsite, red granite, &c., as well as a considerable number of striated limestone and sandstone boulders. Formerly the "marl" was used as a manure, or rather as an amendment, for its fertilising value depended entirely on its content of carbonate of lime. The occurrence of numerous marl-holes, now for the most part filled with water, enables one to trace the deposit over the whole district. The second variety consists of sands and gravels containing numerous shell-fragments, magnetic iron sand,

pebbles of chalk-flints and jasper, and lumps of anthracite, lignite, and bituminous coal. To this deposit the name "manure gravel" has been applied, since, like the "marl," it has been found to possess a considerable fertilising value. The manure gravels do not occur in a continuous sheet, but in isolated patches often far removed from one another. Finally, overlying the marl and gravel, and extending throughout the whole area, a third deposit consisting of local more or less angular rock-fragments in a loamy non-calcareous matrix has been recognised. This constitutes the "glacialoid" drift of Kinahan and the "illusory or fictitious" drift of Bell.

As early as 1846 the shelly "marl" and gravels of Wexford attracted the attention of geologists. About that date, Captain James and Professor Edward Forbes¹ examined the deposits and found in them, amongst others, fossils such as *Fusus contrarius*, &c., of a distinctly Pliocene facies. The finding of such a fauna in the series led these observers to refer the formation to the Pliocene System.

Later, G. H. Kinahan, when surveying the district, observed that the "marls" rested on a glaciated rock-floor, and he was thus forced to recognise the more modern character of the formation.² To account for the uniformity and marine aspect of the deposit, he postulated a post-glacial submergence of the land to the 300-foot contour line, and in this post-glacial sea—the "Esker Sea"—he supposed the marl and gravels to have accumulated. Kinahan rightly described the gravels as resting on the marl, with material composed of local rubble augmented by detritus from the hills overlying these deposits. From the year 1887 to 1890, Mr. Alfred Bell presented to the British Association a series of reports on the manure gravels of Wexford, in which he gives an exhaustive list of the shells found in this formation. The list includes many molluscan forms not at present living in the adjoining seas, and amongst them, a Pliocene facies which he considered not earlier than the late Pliocene

¹ *Journ. Geol. Soc. Dublin*, vol. iii., p. 195.

² See *Mems. Geol. Survey of Ireland* to sheets 158 and 159 (1882), and 169, 170, &c. (1879).

stage of East Britain. Bell regarded the "marl" as a newer deposit than the manure gravels, and agreed with Kinahan in supposing it to have been deposited in a post-glacial sea. Like Kinahan, he recognised an overlying drift which he termed an "illusory or fictitious" drift.

Taking up a different attitude from the previously mentioned observers, Professor Hull saw in the "marl" with its striated boulders a drift deposit equivalent to the Lower Boulder-clay of other parts of the country. He likewise regarded the manure gravels as equivalent to the Middle Glacial Sands and Gravels, and the overlying drift as an Upper Boulder-clay due to a second glaciation.¹ With Professor Hull's conclusions, the writer, from his personal observations, finds himself in complete accord. At various points throughout the area the true succession of the drifts can be plainly seen. On the shore at Greenore Point, about 60 feet of "marl" may be observed resting on glaciated rock with well-marked striae bearing N. 47° E. All along the coast near Rosslare and to the south of Greenore Point, equally good sections of "marl" were noted, either resting on the rock-floor or on a few feet of local rubble representing the "head" on the pre-glacial rock-platform which occurs in this locality. Some lens-shaped beds of fine sand were noted in these sections, and the marl sometimes exhibits the tea-leaf type of stratification. On the southern coast of Wexford occur similar marl cliffs, but of less vertical dimensions. The marly drift diminishes on the west towards Kilmore, where it is seen to thin out and disappear.

The cliff-sections on the southern shore exhibit also the true stratigraphical relations of the various drifts. At Bastardstown, 15 to 20 feet of stratified shelly sands and gravels rest on the "marl," and a similar succession is shown at other points along this coast, as at Ballygrangans to the west of the former locality. These deposits are normally overlain by about 5 to 7 feet of drift containing many

¹ "Physical Geology of Ireland" (1878), p. 84. P. F. Kendall and R. G. Bell have also regarded the Wexford Gravels as Glacial ("On Pliocene Beds of St. Erth," *Q. Journ. Geol. Soc. London*, vol. xlii. (1886), p. 201).

angular fragments of the local rocks, with some of the more flaky boulders, as Kinahan observed, resting not horizontally, but on their ends. Near Wexford town, along the northern shore of the Slaney estuary, a little to the N.W. of the new wooden bridge, good sections showing the succession of the three drifts are exposed. Here the marl may be seen resting on the rock-floor, and overlying it several feet of shelly gravel containing flints, jasper, coal, &c., the latter drift being capped by an Upper Boulder-clay of about 6 feet in thickness. Farther inland, at Little Clonard, and at the Deeps, near Killurin, the same succession can be traced.

The marl with its numerous glaciated boulders is undoubtedly Lower Boulder-clay, differing from the commoner type of Lower Boulder-clay drift in consisting mainly of material swept inland by the ice from the sea-bottom, instead of having been derived from the unassorted products of weathering accumulated on a pre-glacial land-surface. This deposit really represents the englacial moraine of the Irish Sea ice-sheet which invaded this portion of the Wexford area from the north-east.

As the general ice-sheet faded away, a portion of the superficial layers of the "marl" were subjected to washing and re-arrangement by waters from the melting glacier. The finer material was thus washed away and the residual coarser elements were rolled and concentrated by the torrential currents from the melting ice. The sands and gravels thus formed are obviously the equivalents of the Middle Sands and Gravels described from other localities.

When the great ice-cap disappeared from this region, a local glacier, having its gathering-ground in the highlands of the Leinster Chain, was at length enabled to establish for itself an independent drainage, and to bring along with it local material which it finally deposited on the surface of the "marls" and gravels to form the Upper Boulder-clay of the district.

To account for the presence of Pliocene shells in the Wexford drifts is somewhat difficult, but it is not unreasonable to suppose that they are derived fossils brought

by the ice from loose Pliocene deposits lying in the bed of the Irish Sea. The occurrence of such enormous quantities of chalk-flints and coal may be accounted for in a similar manner. These erratics might easily have been brought by the Irish Sea glacier from coal-bearing and Cretaceous strata also hidden in the Irish Sea basin.

The correlation of the Wexford and Dublin drifts will be fully discussed in a subsequent paper.

Geological Survey Office, Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include two Gibbons, and two Prevost's Squirrels from Dr. T. M. Falkiner, an Indian Wild Dog from Mr. W. E. J. Dobbs, a Russian Brown Bear from the Duke of Orleans, a Rabbit from Mr. J. Wilson, a Goshawk from Dr. Tate, a pair of Kestrels from Mr. Jas. Baily, a Long-eared Owl from Mr. J. F. Jamison, two Wild Duck from T. N. Scott, two Blue Herons from Captain Irwin, a pair of Cherry-crowned Mangabeys, a Mona Monkey, two Guinea-Pigs, a pair of Barn Owls, two Alligators and two Tortoises have been deposited or purchased.

The Gibbons are an especially welcome acquisition, as for several months the Monkey-House has been without these active and graceful apes.

NOTES.

BOTANY.

Irish Plants.

Ceratophyllum dermersum was observed last month growing in Hacket Lough near Headford; it has not been recorded previously for any of the three divisions of Galway. *Orobanche minor* is extending its range. I note in the present issue (p. 163) some stations in Kerry, and since then have seen it at Carrowmore near Sligo, the first station in the west—growing on sown clover, as it so often does. I do not think any of our northern botanists have recorded the appearance and spread of *Elymus arenarius* at Ballycastle, Co. Antrim. It was not there twenty years ago, but now forms conspicuous colonies on the sands at the old harbour—it may have been thrown out from a garden. In the aluminium works at Larne, I recently noticed *Senecio vulgaris* var. *radiatus* Koch growing abundantly. Neither of these two last is on record for the North-east.

R. LLOYD PRAEGER.

Dublin.

ZOOLOGY.

Records of Birds in June and July, 1912, from Tuskar Rock and Lighthouse lantern.

I crossed to the Tuskar Rock on Monday, July 1st, and was informed by the light-keepers that on the previous day (June 30th) a very large Wheatear and a Whitethroat appeared and perched on the rock; they remained for several hours. On July 4th, at 2 a.m., a small female Willow-Warbler fluttered against the glass of the lantern and was captured by Mr. Power, who preserved it in spirit and has since kindly handed it on to me. On July 5th, at 5 a.m., Mr. O'Leary tells me that he noticed a Pied Wagtail on the rock, also an immature Starling (in brown plumage). The latter remained all day and was seen by the other light-keepers on duty at the Tuskar. Moreover, at 11 p.m. same night, Mr. Power saw a similar bird (he believes it to have been a young Starling) flying in the rays close to the glass of the lantern. Between 10 p.m., July 14th, and 2 a.m., July 15th, several birds were noticed flying in the rays of the lantern. They were probably Starlings. On the evening of July 14th the light-keepers saw a common Sandpiper on the rock.

On July 15th Mr. Glanville observed a Whinchat on the rock. I am satisfied he knows the bird well, having pointed it out to me more than once. Mr. Glanville also tells me that he saw several Willow-Warbblers and Sandpipers on the rock between July 15th, and 22nd.

On Monday, July 22nd I crossed to the rock and Mr. Glanville very kindly handed me the following birds collected by him in the early hours of the morning;—A young male Starling (brown plumage), picked up dead on the balcony at 2 a.m. An injured immature female Swift, caught on the balcony, 2.30 a.m. A female Sedge-Warbler, picked up dead on the rock, 4.15 a.m. There was also a Cuckoo (immature) on the rock that morning. Of the four specimens received, the occurrence of the Willow-Warbler at the lantern on July 4th is certainly remarkable. The occurrence of the Sedge-Warbler, whose injured skull affords objective evidence that it also struck the lantern, indicates, I should think, the earliest Irish record of its emigration. The earliest autumnal specimens of these two Warblers which were received by Mr. Barrington (as mentioned in his "Migration of Birds") bears the date of July 29th. The date of capture of the Swift is interesting as it affords us evidence of migration of this bird at a date when such was hardly supposed to have commenced.

C. J. PATTEN.

Rosslare Pier, Co. Wexford.

The Fulmar in Ireland.

It may interest readers of this magazine to learn that I have discovered a new breeding place of the Fulmar Petrel in Co. Donegal. For the last two years I have known of Fulmars which remained during the summer on an exposed headland on the west coast of this county. Until this year,

however, I was unable to investigate matters for myself. On June 11th I visited the locality and saw about twelve pairs of Fulmars on or about the cliffs. The majority did not seem to be breeding, but I saw two females sitting on their eggs. They had scraped out a cavity in the boulder-clay on narrow ledges in the steepest part of the cliff and far down. The young have been successfully hatched. Although I repeatedly visited the spot I never saw further indications of breeding among the remainder of the birds, though they spent most of their time lying on the ledges. It is only along about 400 yards of cliff that the Fulmar is to be seen, though the seabird colony extends for several miles on either side. The cliff where this bird breeds is about 400 feet high and very steep, and the Fulmar seems to keep to those parts of it which are covered with a thick deposit of rich soil, and to avoid the bare rock ledges. The nesting cavity is in no way concealed and the bird is a very conspicuous object when sitting on her eggs.

C. V. STONEY.

Oldfield Park, Raphoe.

Having been favoured by Mr. Stoney with information as to the locality of the Fulmar colony he describes, I am able to say that it is the same as that discovered last year by Messrs. Malcolmson and Green (*Irish Naturalist*, vol. xx., pp. 150, 151). On 8th and 9th July, 1912, I visited the Fulmars' breeding cliff on the north coast of Mayo and found them decidedly increased. I saw at least forty birds sitting on their ledges, besides those wheeling in the air. In several cases two Fulmars sat side by side, and I would ask Mr. Harvie Brown if he does not think the male Fulmar will rest beside his hatching mate when not fishing, or will two females hatch close together on the same ledge? The ways of these birds are new to us in Ireland. I subsequently explored all the higher cliffs of Achill and Clare Island without finding any Fulmars, though the 1,000 feet cliffs on Clare Island, which I viewed from above and below, are eminently suitable for them. There appear, therefore, to be but two breeding localities as yet in Ireland—one in Donegal and one in Mayo, where they are increasing. Both Mr. Stoney and I have noticed breeding Razorbills sitting close to Fulmars.

R. J. USSHER.

Cappagh, Co. Waterford.

Golden Eagle and Fulmars in North Mayo.

On 9th July I visited the great cliff, over 700 feet high, on the north coast which has so long been tenanted by Eagles. There is a projecting spur from which the cliff-face can be viewed; as soon as I made my appearance there a Golden Eagle took wing from it and, after soaring over the coast to the west, where it was pertinaciously attacked by a swooping Kestrel, it alighted on a bare cliff where it rested for more than an hour until, on my return, it again took flight to the eastward. Its head, greater wing-coverts and the proximal part of its tail were light fulvous, contrasting

with the dark brown of the rest of its plumage and there was no white to be seen. From its sluggish demeanour I think it possible that on some of my three former visits to this cliff an Eagle may have been perched there in some nook undiscovered, as the precipices are so vast. The four masses of sticks built up by the Eagles from time to time remain; out of some of them green plants are now growing, but two others look fresher on the top. It is probably years since eggs were laid on any of them, as but one Eagle survives in Mayo. I am informed by Mr. Richard Pike of Glendaray House, Achill, that on 1st June last he saw an Eagle pursued by two Ravens fly over Glendaray towards the east, and that about the time I saw the bird in the north Mayo coast he saw an Eagle on the wing between Meenawn and Dooega cliffs in Achill. I am disposed to think that this is the same bird that I saw on 9th July, for if there were a second it is probable that they would be seen together. Mr. Pike heard that in 1894 a pair were seen on Clare Island.

The colony of Fulmars that I discovered a year ago is decidedly increased, and a lower portion of the same great cliff is the part most occupied by them now, though many scattered pairs are resting on the higher ledges. I should say they are breeding at from 400 to 600 feet above the sea. I have seen at least forty Fulmars sitting on this cliff besides those that were wheeling in the air, but several were probably males. There seems to be another small colony on a neighbouring island, as eggs are said to have been taken.

R. J. USSHER.

Cappagh, Co. Waterford.

“Birds New to Ireland.”

In reply to Mr. Barrington's criticism *re* my provisionally-named Blue-headed Wagtail which I obtained last autumn at the Tuskar (*vide Irish Nat.*, 1912, p. 84) I wish that Mr. Barrington would describe his “doubtful specimen” obtained at the Tuskar on September, 1895 (*vide Irish Naturalist*, 1912, foot-note, p. 50) as I feel confident that after Mr. Barrington has very carefully scrutinised his specimen he can, to the best of his belief, put a name upon it. In the interests of Irish ornithology the specimen demands a label. It seems to me highly improbable that *Motacilla Rall* and *M. flava* are indistinguishable when in immature dress. It is more likely that ornithologists have as yet not detected the cardinal points by which they can be distinguished with absolute certainty. On the 9th June I spent three solid hours in the British Museum re-examining the Blue-headed and Yellow Wagtails, and comparing them with my specimens, and I am bound to say that I am not at all sure that the labels attached to the immature of each are infallibly correct. I say this owing to the great difficulty there is in following up a given characteristic of one of the species. As I went through the large collection of skins this or that characteristic was maintained for, say, a dozen or so specimens; then one found oneself dealing with the corresponding characteristic of the

other species. It was not that there was a blending of the two characteristics but a real distinction between one andt he other. If one had placed before him a score, say of Blue-headed, and the same number of Yellow Wagtails freshly killed in the flesh all in immature plumage, but birds which had been properly identified BEFORE DEATH by some reliable clue, e.g., *difference of voice*. I cannot but feel that the differences in the two species could be established in regard to plumage markings and other characters to be made out on the dead specimens. Many of us are wont to manufacture difficulties in arriving at conclusions regarding identification of birds because of our implicit belief in the infallibility of the Museum Label. I may be hyper-sceptical, but better err on that side than to be too credulous.

The University, Sheffield.

C. J. PATTEN.

Late Spring occurrence of the Sky-lark at the Tuskar Lighthouse.

Between 1 and 1.15 a.m. on Saturday morning, May 18th, Mr. Power, the lightkeeper on watch, captured a Sky-lark as it struck the Tuskar Lighthouse lantern. In rapid succession followed a Sedge-Warbler and a Spotted Flycatcher, all three birds being obtained within fifteen minutes. No other migrants were observed that night. The Lark proved to be a large adult male, with huge testicles, the tubules of which showed on histological examination to be actually congested with countless swarms of ripe spermatozoa. From the condition of the genitals one would not think the bird purported effecting a much longer pilgrimage, but rather that it would alight at the earliest opportunity and commence mating. Possibly it may have lost its mate, the latter perhaps having lost its life through being devoured by a stoat or a rat when hatching. The male then in its eagerness to procure another mate may have become stimulated to migrate. That it had flown some distance and not simply crossed directly from the mainland of Co. Wexford is shown by the fact that the gizzard and in fact the whole digestive tract were completely empty. The Sky-lark migrates into Ireland in March, and in smaller numbers in April, to remain and breed, and it is also a spring emigrant; but it is more likely that the birds which appear towards the end of April and in May are *birds of passage* bent on pushing further north for breeding purposes. I am not aware of a date from a lighthouse lantern for this species as late as the one herein recorded. Mr. Barrington in his "Migration of Birds" Analysis of Reports, 1881-97, p. 105, gives April 20th as the date of the latest specimen secured, viz., from the Maidens in 1890, but "a few observations are usually chronicled in May." Mr. Eagle Clarke in his "Studies in Bird Migration" vol. i., p. 130, gives March to May 7th as the period of migration of the Skylark as a bird of passage to northern Europe.

The University, Sheffield.

C. J. PATTEN.

REVIEW.

A LOCAL LIST.

A Catalogue of the Vertebrate Fauna of Dumfriesshire. By HUGH S. GLADSTONE, M.A., F.R.S.E., F.Z.S., M.B.O.U., author of "The Birds of Dumfriesshire." With map. Pp. 80. Dumfries: J. Maxwell and Son, 1912.

Mr. H. S. Gladstone's "Catalogue of the Vertebrate Fauna of Dumfriesshire" has evidently been drawn up with much care, the author's own volume on the "Birds of Dumfriesshire" furnishing, of course, the basis for the ornithological part, while the notes of the late Mr. Robert Service are specially indicated as having provided most of the material for the rest. In nomenclature the author claims to have followed the "latest system," and trinomials are applied to a good many of the birds in the "Catalogue" but not to anything like the number that would have received them had the "Hand List" of Mr. Hartert and his colleagues been out when these pages went to press. We cannot help thinking that it would be better for British or Britannic county faunas to preserve uniformity with one another by following the names hitherto in use than for each such work to differentiate itself by following the system that happened to be "latest" when it was written. It may, however, be taken for granted that both plans will possess their votaries. We are more concerned over Mr. Gladstone's treatment of the local names of Dumfriesshire animals than at his choice in the matter of systematic names. He only mentions in the body of this "Catalogue" such local names as he thinks "misleading"—among which, by the way, we get the amusing caution that a countryman's reference to "Nightingales" in Dumfriesshire need not startle the ornithologist, since moths are sometimes spoken of as "Nightingales" in that county. Any local names that the author thinks innocuous are relegated to the index. Surely this is burying an interesting feature rather cruelly out of sight. Besides, the inclusion of such names in the text would have furnished an opportunity for some particulars as to which local name—in the case of a species possessing several—is the more generally in use. For instance, is a Dumfriesshire man more apt to speak of a Yellow Bunting as a Gunner, a Yeldrock, a Yellow-hammer, a Yellow Yite, a Yeorlin, or a Yolt? Mr. Gladstone contents himself with giving each of these six names separately in the Index, and telling by a parenthesis that it belongs to the Yellow Bunting. Similarly, we find that the Chaffinch, the Dipper, and the Long-tailed Titmouse are rather rich in a variety of local names, for which, however, we have to spend a good deal of time in searching. Mr. Gladstone is entitled to thanks for the amount of information given, but we think he might have set a better example to others in the matter of arrangement. A few references to authorities would also have improved the "Catalogue," though the author apparently thinks that these would have needed too much space.

C. B. M.

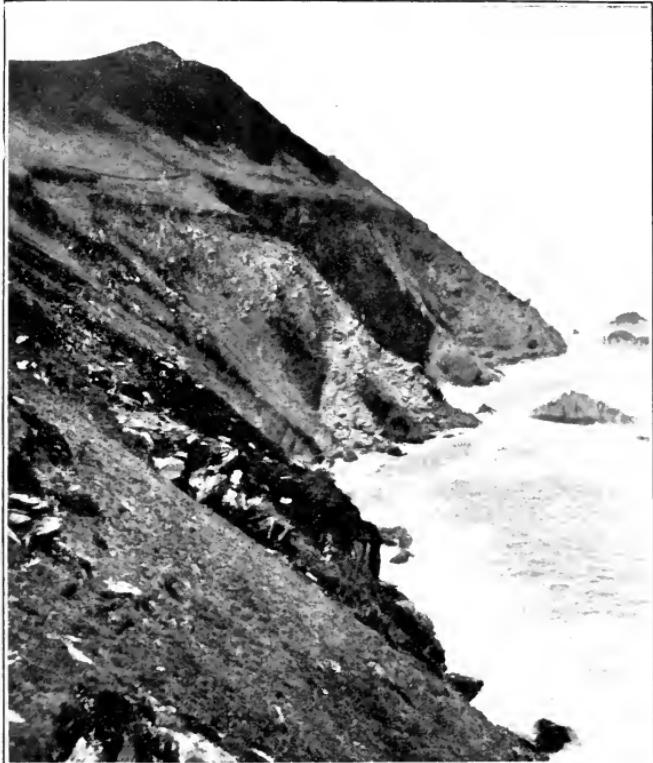
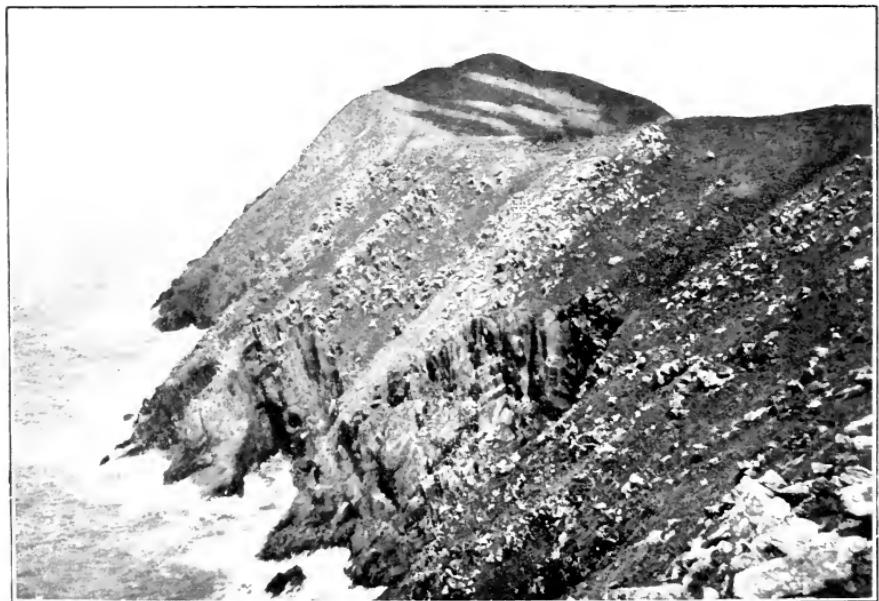


Fig. 1—Looking S.W., showing Foilbeg and Slieverdonagh
(937 ft.) Tearaght in distance.



A. W. Stelfox, Photo.

Fig. 2—Looking N.E., showing Croaghmore (961 ft.).

THE TERRESTRIAL MOLLUSCA OF THE GREAT BLASKET AND BEGINISH.

BY A. W. STELFOX.

(PLATE 3.)

It is not difficult to imagine a time when the Blaskets formed a portion of the mainland of Kerry. Only two of the islands—The Tearaught and Inishtooskert—lie without the twenty-five fathom line. Numerous small islets or illauns, and reefs exist between the Great Blasket and the coast of the Dingle peninsula opposite. Many of these smaller islets, as well as Beginish, are capped by Glacial drift and it is apparent that the sea is rapidly wearing them away. Even on the Great Blasket considerable wastage appears to be going on, except at the eastern end of the island where blown sand is accumulating. The fauna of the islands will naturally, therefore, be closely related to that of the nearest part of the mainland, unless we are to believe that these western islands are stocked by specimens carried by chance means from all points of the compass.

Four days were spent by me on the Great Blasket, in company with Mr. & Mrs. R. Lloyd Praeger in June, 1912, and about two hours on Beginish. Before reaching the islands I made a rough list of species which I expected to find there. In making this I was guided mainly by the lists which have been compiled on the western islands of Galway, Mayo, and Donegal, and that from the adjoining mainland of Kerry, since no information concerning the mollusca of the Blaskets has been published hitherto. This provisional list contained thirty-six species, two of which were fresh-water species. Of these all but nine were found on the Great Blasket, while five species which I had not counted upon procuring—though none of them caused any great surprise when found—turned up also.

The nine species looked for and which I could not find were *Agriolimax laevis*, *Arion circumscriptus*, *Zonitoides excavatus*, *Punctum pygmaeum*, *Hygromia hispida*, *Vertigo pygmaea*, *V. antivertigo*, *Acicula lineata* and *Pisidium personatum*. Of these *Z. excavatus* appears to be absent from the extreme west of the Dingle promontory. *H. hispida*

appears to be absent, though no reason for this can be given; but as no really natural habitat for fresh-water species occurs on the island during dry weather *P. personatum* could not be expected to find a dwelling-place. The remaining six species should occur, and it is just possible that the dry summer of 1911 and the drought during April and May, 1912, may have caused a temporary shortage, and hence a second visit to the island might reveal their presence.

The five unexpected species found were *Limax maximus*, *L. cinereo-niger*, *Sphyradium edentulum*, *Helicella virgata* and *H. intersecta*. All of these occur on the opposite mainland.

Since Mr. Praeger has described already (pp. 157-158 *supra*), the main features of the Great Blasket I need not repeat these. The chief points from a conchologist's point of view are, however, as follows :—

- (a) A quick run-off of rain and hence want of standing water.
- (b) The crumbling nature of the north-western cliffs, well shown in the two photographs on plate 3, and therefore scanty vegetation and little shelter for mollusca.
- (c) The destruction of the vegetation by grazing sheep over the greater portion of the island ; and also by wind and sea along the western and south-western slopes, which are very dry and bare.
- (d) The influence of man appears nil, and no species seems to have been artificially introduced.

LIST OF SPECIES FROM GREAT BLASKET.

Limax maximus L.—A single very large specimen, slightly paler than the type in colour, was taken at dusk just emerging from its retreat beneath one of the thousands of rock-slabs scattered over the slopes between Garraun Point and Canknock, near the north-eastern corner of the island, at an altitude of about 250 feet. This specimen is the first example of *L. maximus* which I have taken on any of the western islands in an undoubtedly native habitat, all others having been observed within the precincts of habitations. I cannot agree with Dr. Scharff¹ that we must look upon a specimen as a native unless

¹ See note on *Testacella haliotidea*, *supra*, p. 155.

there is good evidence to the contrary ; it seems to me safer to regard with suspicion—as most botanists do—any specimen which cannot honestly be considered native.

L. cinereo-niger Wolf.—One fine specimen under a stone in the dry bed of the small rivulet, which in wet weather flows into the gully a quarter of a mile east of Bannig, on the south coast, and a half-grown example under a stone above Coosnacrisaun on the north slope of the island. Both examples were of a pale yellowish-brown ground-colour, with darker spots. A very beautiful variety.

L. arborum Bouch.-Chant.—In extraordinary abundance along the rocky slopes of the southern coast at night and evidently feeding on the lichens which cover the surface of the rocks. It is to be met with also on the greater portion of the island from close to sea-level to the summit, 961 feet. The prevailing form seems referable to var. *alpestris* Less. and Poll.

Agriolimax agrestis (L.)—Not seen in the drier parts of the west end, but elsewhere common from sea-level to summit. Mainly typical in colour, and the brownish form which prevails on the islands of Mayo and Donegal appeared rare.

Milax gagates (Drap.)—Very common along the north-western cliffs opposite Illaunbaun and above Coosnafinnisha, but not seen in any other part of the island. All specimens were referable to var. *plumbea* and rather small in size.

Vitrina pellucida (Müll.)—A single dead shell was taken under a stone beside the ruined Signal Tower at 765 feet altitude. No doubt common in winter and spring.

Hyalinia cellaria (Müll.)—On the more northern islands and along the coast of western Ireland this species has always proved, so far as my experience has gone, to be an absentee from the cliffs, and confined to the cultivated areas, and thus its standing as a native in those districts has always appeared doubtful. On the Great Blasket, however, its large form (= *Vitrea hibernica* Kennard) is abundant on many parts of the cliffs, particularly near Coosnacrisaun, and at about 800 feet altitude on the northern escarpment of Slieve-donagh. Here, in fact, this shell takes the place usually filled by *H. alliaria* on the western islands, as the characteristic species of the genus. On the opposite mainland of Kerry *H. cellaria* lives on the northern cliffs of Brandon to a height of at least 1,250 feet, its highest recorded station in Ireland.

H. alliaria (Miller).—Occurs sparingly over the greater part of the island almost to the most western point. Mainly typical.

H. nitidula (Drap.)—The usual western form with drooping and expanded body-whorl occurred in several places on the cliffs ; but it was common only in one place at Foilbeg. Several white specimens were noted, while most were pale in colour.

H. pura (Alder).—On the northern cliffs : frequent. Mainly of the typical form.

Hyalinia radiatula (Alder.)—Sparingly round the north-western corner of the island ; but not seen elsewhere.

H. crystallina (Müll.)—Rare and only seen occasionally. A small form.

Euconulus fulvus (Müll.)—Several large dead shells at Foilbeg. Evidently not a common species on the island.

Arion ater (L.)—Frequent but not often abundant. Vars. *castanea*, *plumbea* and *aterrima* were noted.

A. subfuscus (Drap.)—Very scarce and only seen near the village and along the north-eastern cliffs.

A. intermedius Normand.—Many examples of the bright yellow form on the damper parts of the cliffs. The grey form was noted also.

Sphyramidium edentulum (Drap.)—Near the site of the ruined beehive huts above Poulauber, and at Foilbeg.

Pyramidula rotundata (Müll.)—With the possible exception of *Pupa cylindracea* this must be looked upon as the dominant species over the greater part of the island. Many colonies of the whitish-green form were observed, while most specimens were pale in colour.

Helicella virgata (Da Costa).—Abundant at Trabane. Var. *submaritima*, common ; var. *albina* common ; typical form rare.

H. itala (L.)—Common on the sandy cliffs at Trabane.

H. intersecta (Poiret).—Common in the deposits at Trabane, but rare alive. Also lives on the dry slopes above Coosnafinnisha with *V. pulchella*.

H. barbara (L.)—Abundant in the sandy fields and on the slopes at the western end of Trabane.

Vallonia pulchella (Müll.)—On the dry grassy slopes above Coosnafinnisha at the north-western corner of the island.

Helix aspersa (Müll.)—Abundant at Trabane and in the fields near by.

H. nemoralis (Müll.)—Occurs over the greater part of the island below 300 feet, and common in many of the gullies along the north coast and at Trabane. This was one of the few species seen in the arid wastes towards the west end of the island. A large race occurs in the sheltered parts of the great gully of Foilbeg and also in the deposits at Trabane.

The following forms were taken on the island :—

<i>auran'tia</i>	12345. (123) (45) 1 (23) (45). (12) 345. (12345). 00300. 00000.	<i>libellula</i>	12345. (123) 45. 1 (23) (45). (123) (45). 12045. 00300. 00000.
<i>castanea</i>	12345. (12345). 00300. 00000.		

One specimen of the var. *albolabiata* was taken at Foilbeg ; the remaining specimens all had black or purple lips. None of the *castanea* form were taken except on the sand at Trabane, where specimens with a band

formula of 00300—the third band often being abnormally broad and sometimes split—were common.

Some specimens taken on the dry slopes of the island did not measure more than 17.5 mm. in diameter. These contrasted strongly with the large race found at Foilbeg, some of which reached a diameter of 24 or 25 mm.

Cochlicopa lubrica (Müll.)—Not common, but generally distributed.

Pupa anglica (Fér.)—Typical examples were found to be common in the northern and eastern gullies. Var. *pallida* occurred frequently, while var. *alba* was taken at Foilbeg and with *V. substriata*.

P. cylindracea (Da Costa).—Everywhere, even to the western extremity and to the summit of the Fatal Cliff (over 900 feet). Most examples were referable to the var. *anconostoma* Lowe. (See *Proceedings R. I. Acad.*, vol. xxxi., part 23, pl. ii., figs. 47, 48 & 49.)

Vertigo substriata (Jeff.)—A single specimen was taken in damp moss at about 800 feet on the northern escarpment of Slieveodonagh.

Clausilia bidentata (Ström).—Frequent in the damper parts of the cliffs.

Carychium minimum (Müll.)—Common in similar situations to the last species.

Limnaea truncatula (Müll.)—This, the sole representative of the fresh-water molluscs, occurred in countless hundreds in one spot at Foilbeg where sheets of the alga *Cladophora crispata*¹ grew over wet rocks.

Above the spot where *L. truncatula* was found, are several artificially constructed pools, but no fresh-water shells were seen in these. In wet weather, rain-pools must form likewise on the flat peaty ground between the Signal Tower and Slieveodonagh, but I was unable to find any shells here either.

All the species in the foregoing list are to be met with on the opposite mainland of Kerry, the Dingle peninsula, and all are generally distributed throughout Ireland, with the exception of *H. virgata*, which is absent from the north-western quarter comprising the county divisions of East and West Mayo, Sligo, Leitrim, Fermanagh, East and West Donegal, Derry and Tyrone.

On the sandy cliffs at Trabane are various deposits containing land-shells. None of these, however, appear to be of great age, though in several cases they are from four to five feet in depth. The following shells were taken in these deposits:—*Hyalinia cellaria*, *Helicella itala*, *H. intersecta*, *H. barbara*, *Helix aspersa*, *H. nemoralis*, *Cochlicopa lubrica* and *Pupa cylindracea*.

¹Named by Mr. Wm. West.

LIST OF SPECIES FROM BEGINISH.

- Agriolimax agrestis** (L.)—Type and var. *lilacina*.
Milax gagates (Drap.)—Very common along the northern and western coasts.
Vitrina pellucida (Müll.)—One dead shell on northern cliffs.
Hyalinia alliaria (Miller)—Type common along northern cliffs.
Arion ater (L.)—Rare.
A. subfuscus (Drap.)—Very rare.
A. intermedius (Normand).—Common on northern coast.
Pyramidula rotundata (Müll.)—Common.
Helicella intersecta (Poiret).—On sandy western cliffs.
Vallonia pulchella (Müll.)—With last species.
Helix aspersa (Müll.)—In abundance round the ruins of the old house
Possibly introduced by man.
Pupa cylindracea (Da Costa).—Common.
Clausilia bidentata (Ström.)—Rare except in one spot on the northern cliffs.

Unlike the Great Blasket, this islet is flat, and covered with glacial drift. The run-off is not quick and therefore the vegetation is rather more luxuriant, in spite of the grazing of sheep and cattle. There is a large drinking-pool—which was quite dry, however, on the occasion of our visit—as well as several rain-pools, but no trace of fresh-water shells was seen on the island.

Belfast.

CERIANTHUS LLOYDII AND ADAMSIA PALLIATA ON THE DUBLIN COAST.

BY NATHANIEL COLGAN, M.R.I.A.

A dredging made in 16 fathoms off Church Island, Skerries, on the 13th July last, yielded me, along with some interesting Holothurians and Nudibranchs, a single specimen of each of the above-named Sea-Anemones. So far as I can discover the Cerianthus is an addition to the Dublin marine fauna, and to the marine fauna of East Ireland, while the Adamsia, though not new to Dublin, is certainly rare in its inshore waters. When first detected at the bottom of a heavy mass of dredged material the Cerianthus had the

aspect of a gephyrean worm. It was a buff-coloured cylinder about one inch in length and a quarter of an inch in diameter, and appeared to have been crushed and injured in the dredge. After a hasty examination the supposed gephyrean was transferred to a tube of fresh sea-water. Here it revived and next day was found to have greatly changed its form. It was extended to fully two inches in length, one end was swollen into a bulb or knob, and a confused mass of tentacles appearing at the opposite end showed with sufficient clearness that the animal was a sea-anemone and not a gephyrean.

Throughout the three weeks during which the animal lived in captivity, it continued to change its form by slowly propagated waves of expansion. The body was perfectly flaccid. When lifted on a needle it hung inert across it like a dead earth-worm, and in the dish of sea water it insinuated itself with perfect ease through the narrow interstices between the small stones strewn over the bottom. From time to time the tentacles were fully displayed, but it was only after many unsuccessful attempts that I secured a favourable opportunity of examining the base or aboral extremity. This was seen to be conspicuously perforated, the orifice being placed excentrically, and this feature taken together with the form and colour of the animal and of its tentacles, rich maroon in the inner smaller rows and whitish with red-brown base in the outer and longer row, placed beyond doubt the identity of the animal with Gosse's *Cerianthus Lloydii*. The tube which usually invests this species had evidently been torn off in the dredge ; but a few days after capture an incipient tube or case of whitish mucous matter was observed to be forming around the animal, as described by Gosse in his "British Sea-Anemones," p. 269. Hitherto this species appears to be on record in Irish waters, only for the west and south-west of the island, from Smerwick, Valentia, Clare Island, Killery Harbour and Bofin Harbour.¹

¹See Miss Jane Stephens, List of Irish Coelenterata, *R.I.A. Proc.* xxv. B. p. 25, 1905, and Clare Island Survey, part 58, Coelenterata, *R.I.A. Proc.* xxxi., 1912.

The specimen of *Adamsia palliata* taken in the same dredging with *Cerianthus*, was a small one, roughly globular and little more than an inch in diameter. Although no vestige of the supporting shell was visible, a living hermit crab inhabited the sea-anemone, or, at all events, appeared to inhabit it, for the gaudily blotched body of the anemone completely surrounded the small opening through which the head and fore limbs of the crab were protruded. No particular attention was paid to the species of the crab, but from recollection of the comparative smoothness of the claws, I am inclined to think it was *Pagurus Prideauxii*, the species so frequently found commensal with this sea-anemone. It was only on the death of this *Adamsia*, a week after its capture, that I was able to discover the species of shell which it so completely invested. This turned out to be *Turritella terebra*. A fragment of an old shell, three whorls including the body whorl, had been selected by the *Adamsia* as its support, and the defect in size of the broken shell the sea-anemone had made good by constructing a leathery, membranous ring attached to the shell mouth and extending beyond it to a length exceeding that of the three whorls.

In the selection of its univalve support *Adamsia* appears to be quite as impartial as are the various species of Hermit Crab. Amongst the genera made use of are *Buccinum*, *Fusus*, *Trochus*, *Natica* and *Bulla*. Broken shells are frequently selected, and Dr. Landsborough, some three quarters of a century ago, took a specimen off Arran in the Clyde inhabiting, or rather investing, just as the Skerries specimen did, a fragment of *Turritella*. Irish records for *Adamsia* as collected in Miss Stephens' List are not numerous, though the species appears to be widely distributed round our coasts in from 7 to 70 fathoms. The Skerries specimen is the first which has occurred to me off the Dublin coast out of more than a hundred and sixty effective dredgings in shallow waters up to 18 fathoms. The species evidently affects deep water.

SPOTTED FLYCATCHERS ON MIGRATION
OBSERVED AT THE TUSKAR ROCK AND
LIGHTHOUSE.

BY PROFESSOR C. J. PATTEN, M.A., M.D., SC.D.

WHEN my first visit to the Tuskar light-station (which took place last autumn) had come to an end, I felt convinced that it would have been attended with much better results had I arrived there earlier in the season, for the purpose of witnessing the initial phases of emigration of several common summer migrants. I did not land on the rock until Monday, September 11th, 1911, and although from that date until Saturday, October 7th, when I departed, the feathered emigrants¹ were still actively on the move, nevertheless, coming on the scene, as I did, in the middle of the movement, I found it was not possible to form any conclusion, either of the initial phase or of the principal period of exodus. This applied especially to those species whose emigration is maintained over a lengthened period in autumn. I therefore decided, on careful deliberation, to revisit the Tuskar light-station this autumn, and to arrive at the beginning of August, though my original plan had been to study migration at some other point on the Irish coast.

I rejoice to say that I came to a right decision. My studies of migration carried out here during August have enabled me not only to supplement and to enhance considerably the value of last season's research, but also to grapple with, and I hope disentangle, many knotty problems regarding our knowledge of the migration of several species of birds which visit the lighthouse. I must, however, in this paper confine my remarks to the migratory movements of a common, somewhat solitary little bird, the Spotted Flycatcher. Having secured fuller data in regard to its emigration than its immigration, it may be well to deal with the former movement first. The month of September, and, in some districts, even the first week in October, constitute the usual period assigned to this species for its departure from our isles.

¹ Immigrants were pouring in during the latter part of my stay, and with the Emigrants, were recorded from the lantern and rock. In this paper the former are not dealt with.

Saunders says¹ :—“ It leaves our isles and the northern portion of Europe in September, but in the South the abundance of insect food enables it to remain later ; and in Asia Minor it has even been obtained late in November.” Mr. Eagle Clarke finds it entered on his Eddystone light-house schedules—filled up for three years—as occurring in May and September.² He also tells us that at light-stations where this species must be regarded as a bird of passage only (its destinations either way being remote from where its migrations have been recorded), its total period of emigration extends from August 16th to November 30th, “ chiefly September.”³ With Mr. Eagle Clarke’s statement that the autumn movement occurs in the middle of August I agree, and hope directly to show that we can push it even further back towards summer. Coming to authorities who have contributed exclusively to Irish ornithology, we find that Mr. Ussher writes :—“ In autumn Flycatchers have been observed in our eastern counties to collect together and draw down towards the sea. The species does not depart until September, but the only occurrences in October I can cite are of specimens received by Mr. Barrington from Black Rock, Co. Mayo, and from the Tearaght, Co. Kerry, the most remote western rocks. In the end of November, 1897, another was sent him from the Tuskar.”⁴

From this, one would gather that Mr. Ussher regards the October and November records as exceptional ; the latter, I believe, is, but I am not at all sure that in early October the emigration of the Spotted Flycatcher has altogether waned away. The bird from the Tearaght, above mentioned, was obtained on October 2nd, 1887. Mr. Ussher’s remarks leave the impression on the reader’s mind that the period of emigration lasts but a month, *i.e.*, during September. However, I hope to show that, by piecing together the records received by Mr. Barrington for July, September, and October, with mine for August and September, the emigratory movements of this bird cover a period little

¹ “ Manual of British Birds,” (2nd Edit.), page 157.

² Studies in Bird Migration, vol. 1, p. 318.

³ loc. cit. p. 134.

⁴ “ Birds of Ireland,” p. 47.

short of two-and-a-half months, and, furthermore, that the exodus which takes place during August is as active as, if not more so than, that which takes place in September.

In his "Migration of Birds" (*Analysis of Reports*, pp. 8, 9), Mr. Barrington is naturally somewhat in a fog, regarding the question of the normal period of emigration of this bird, on account of the curious and, at first sight, anomalous dates of capture of most of his specimens received in autumn. Setting aside two birds, one received on September 21st, 1887, from Coningbeg lightship, and another received on October 2nd, 1887, from the Tearaght rock, both of which dates fall in with part of the time of normal emigration, Mr. Barrington has really been fortunate in receiving specimens, not at purely anomalous dates, and so representing simply haphazard appearances at light-stations, but at periods representing the earliest and latest times of departure. To analyse we find he gets a bird on July 30th, 1895, from the Tuskar. Now so close are the first of my August records (making all due allowance for variations in meteorological conditions in different years) to his record that either of them may be taken as representing the normal early departure of the Flycatcher from our isle. On the other hand, the numerous records, attested by specimens, which I obtained in part of September of *one season*, leave little doubt in my mind that the emigration does not come to an abrupt termination with the closing days of that month, but extends into October. Thus the capture made on October 20th, 1889, at Black Rock, Co. Mayo, as recorded by Mr. Barrington (though I admit it was very late), probably represented an annual occurrence at many light-stations, but as the bird so sombre-plumed, so unpretentious and so silent, is markedly passed over by light-keepers, such annual occurrences are not recorded. But in regard to the specimen obtained on November 20th-30th (?) 1897, at the Tuskar, as mentioned by Mr. Barrington, I should think such an occurrence would be too late to be repeated yearly, at all events in our isle.

On the other hand, Mr. Barrington has been unfortunate in not receiving many more specimens, especially some in August, and more than one in September. This famine of material in autumn, coupled with the fact that from 1887

to 1899 he received only nine specimens in spring, all in different years (except in 1893, when two specimens were received during the same spring on consecutive nights), has led him to take the view that the bird does not appear "to strike the lantern numerously." Adopting the term "strike" in its broadest sense, as signifying contact of the bird with the glass, whether it hurts itself or not, it is true that Spotted Flycatchers, compared with Wheatears, Willow Warblers, Sedge Warblers, Starlings, Thrushes, and others, do not appear in the rays in such numbers together. On the other hand, Flycatchers are much in evidence when nearing the lantern, and shew a marked tendency to come in with little hesitation, and they hit, as a rule, hard against the glass. In the strict sense of the word they are prone to strike harder and proportionately oftener than some of the species above mentioned.

The Spotted Flycatcher is a bird, however, which I have found migrating also by day, hence a certain percentage of birds must avoid the lantern altogether. On the whole I would say that the autumn migration of this bird as witnessed at the Tuskar light-station, is a dominant and not by any means a desultory feature. Furthermore, if my personal observations, which I may now proceed to record, linked together with Mr. Barrington's records, are typical of a season's emigration, then Mr. Barrington's view that in autumn "there is no well marked flight-line observable as in spring" no longer holds good.

As mentioned already, the interval between Mr. Barrington's July record (July 30th) and my earliest record for August (August 6th) is too short to suggest any other explanation than that at the close of July or beginning of August the Spotted Flycatcher begins to move away. But, furthermore, it is noteworthy that on the night of August 6th I obtained not only one but two Flycatchers, and saw many more round the lantern. Emigrating with them were Sedge Warblers, Willow Warblers, Wheatears, Swifts, examples of all of which I collected. Greater Whitethroats were probably also among the gathering, though curiously enough I did not collect any this night. However, in the early morning (4.15 a.m.) of the same date (August 6th) I picked one up dead on the rock. This bird probably struck

on the night of the 5th of August.¹ Again, on Wednesday night at 10.15 p.m. I collected a Whitethroat at the lantern. On August 8th Mr. Glanville handed me a dead Spotted Flycatcher which he picked up in a pool of water on the rock at 9.45 a.m. The bird was not fresh enough to have been killed the previous night, and no doubt it struck on the night of the 6th inst. with the other two above mentioned which were collected.

The way in which I found my second specimen was interesting, and shows the value of making a thorough search with the hand-lamp. At 11 p.m., as I stood on the balcony, a bird dashed in along the path of one of the white beams of light with great speed, hitting the glass with a loud rap just over my head. The strike was made rather obliquely, and the victim "cannoned" off with a rebound which hurled it over the balcony railings down into the abyss of darkness below. From the lifeless aspect of the bird as it was carried off the glass I knew the strike was sufficiently hard to render the victim unconscious, and so I hurried down to the rock, and calculating about where the bird should have fallen, I suddenly switched on my flash lamp and almost at the same moment found my Flycatcher crouching low, half dazed, and gasping deeply with open mouth for breath. Had I not descended at once the bird would probably have recovered itself sufficiently to flutter into some lurking place, only to be discovered and devoured next day by the marauding Herring- or Black-backed Gull.

Here, then, on August 6th, for the most part a dark, overcast rainy night, many Flycatchers appeared, their presence having been attested by the capture of several specimens.

On August 17th, at 9.50 p.m., Mr. O'Leary, assistant light-keeper, collected the fourth specimen. It struck the lantern. He saw another close to the glass. At 10.20 p.m. Mr. Glanville saw two more, and at 10.30 p.m., I saw one—all flying close to the lantern. The night was starry overhead, the luminous rays rather feeble, and the harbour, etc., lights ashore very clear and bright. No other birds appeared

¹ For convenience, I regard all the hours of darkness as one night with a single date. For example, 11 p.m. August 5th, and 2 p.m. August 6th would be included in "the night of August 5th."

at the lantern except Flycatchers, the weather conditions being not by any means favourable for alluring migrants to sway under the dazzle of the luminous beams. Here, again, it is noteworthy that many Flycatchers were seen, not only on this night but on two nights before, and on two consecutive nights after. On the night of August 15th, at 11.20 p.m., I almost had my hands on a Flycatcher as it rested on the balcony. Emigrating with it were Wheatears and Robins ; two of the latter species were collected.

On August 18th, another clear, starlit night, a Spotted Flycatcher struck the lantern at 12.35 a.m., just at the moment when I came in through the balcony door to the inside of the lantern to swallow a mug of cocoa. I hastened out, and just as I had my hands on the half-stunned bird it rose off the balcony and disappeared. I saw a few others in the rays. On August 19th, a night which after 11 p.m. grew misty with falling rain and an inky black sky, Flycatchers appeared in the rays, one nearly striking at 1.10 a.m. Many Swifts and Wheatears were also on the move, and some of the latter were collected.

Here, then, almost on consecutive dates, from August 15th (*i.e.*, excepting one night, viz., the 16th inst.), to the 19th inclusive, we find Flycatchers migrating, illustrating a decided and active emigration of many birds ; this movement was likely participated in along other points of the coast at the same time. The last date in August on which I saw Flycatchers round the lantern was on the night of the 23rd instant. The sky was well overcast, there was plenty of mist, the rays were very brilliant, but the night was only moderately dark, as the moon, in her second quarter, was closely approaching fulness. Willow Warblers, Wheatears, Swifts, and a large bird I took to be a Rail, careered wildly about in the rays, and though no birds came actually in contact with the glass, it was not difficult to recognise Flycatchers by their quick glancing flight and long wings, their aerial movements often being similar to what one sees when this bird is twisting and swerving sharply in pursuit of its insect prey. After a little practice Flycatchers are not very difficult to identify when fairly close to the lantern ; now and again their single highly-pitched note is emitted.

Flycatchers were still migrating to the end of the month, for on August 27th I collected my fifth specimen in daylight, at 9.38 a.m. on the rock.

Thus I obtained in all five specimens between August 6th and 27th; and had I nothing else to do but watch for birds incessantly, except when I was eating and sleeping, I would no doubt have secured a larger number.

But with photography, microscopy, taxidermy, and journal writing I was obliged to stop off my vigilances at times when I imagine birds should have been at the lantern or on the rock.

Coming now to the September observations of 1911, I find that the very day after my arrival (viz., September 12th), I collected a specimen on the rock about 7 p.m. On the 16th inst. at 8 p.m., I collected another which struck the lantern, and saw many others. Its companions on emigration were Willow-Warblers, Chiffchaffs, Grasshopper-Warblers, and Greater Whitethroats, specimens of all of which I collected. On the 19th inst. I got a third specimen at 10 a.m. on the rock, making a total collection of eight specimens during the month of August and part of September; and I made a great many observations, enough and more than enough to demonstrate the frequency with which this bird has appeared on emigration at the Tuskar light-station. It is interesting to note that my latest record is September 19th, which nearly coincides with the date of capture of Mr. Barrington's specimen from Coningbeg lightship—an adjacent Wexford light-station. This bird was procured on September 21st.

Linking together Mr. Barrington's records and mine, we find a migration of almost continued activity going on from July 30th to September 21st, and if we assume that specimens were overlooked during one week, viz., last week of September, and then add Mr. Barrington's record for October 2nd, we find, as stated at the outset, that the normal time covered by the emigration of the Spotted Flycatcher is a lengthy one, extending for at least two, and perhaps two-and-a-half months. In regard to the vernal migration or immigration to Ireland of this species, I believe it also has been little observed. I received only two

specimens (both last May), no doubt partly due to the fact that I left the Tuskar rock before the bird appeared. Mr. Barrington received nine between 1887 and 1889. I therefore not only proportionately received more, but obtained them *during the same spring and from the same light-station*, whereas Mr. Barrington's were all obtained in different years, except in 1893, when two were received during the same spring, "and these were killed at adjacent stations, Arklow South and Blackwater Bank lightships, on consecutive nights, the 16th and 17th May." But it may be noted that Mr. Barrington never obtained more than one from a single station. This shows to what an extent the bird was overlooked by the light-keepers. My two specimens were collected on May 9th and 17th respectively, and I am indebted to Mr. Power, light-keeper, for so kindly saving them and forwarding them to me. He captured the earlier specimen and Mr. Glanville the later one. With the earlier specimen immigrating on the 9th May were Willow Warblers, Garden Warblers, Sedge Warblers, White-throats, and Swallows, specimens of all of which were sent. On May 17th a Skylark and a Sedge Warbler were also collected at the lantern and sent to me. Had I been able to remain on the Tuskar rock for the vernal migration of the Spotted Flycatchers, which appears not to set in till May, I feel sure that I would have secured many more specimens and made many observations to substantiate the frequency of the occurrence of this common little bird during its migratory movements in the vicinity of light-stations.

In conclusion, I wish to express again my sincere thanks to the Commissioners of Irish Lights for so kindly granting me permission to take up my abode again at this famous bird-observatory, and I acknowledge with much gratitude the cordial hospitality shown me and the aid so cheerfully given me in my work by Mr. Glanville, principal light-keeper, and his staff of assistants.

Tuskar Light-station, Co. Wexford.

REVIEW.

HOW DO BIRDS FLY?

The Flight of Birds. By F. W. HEADLEY, M.B.O.U. With 16 plates, and many text-figures. Pp. 163. London; Witherby and Co., 1912. Price 5s. net.

The mechanics of bird-flight are very well explained in this small volume, which has admittedly been written with a view to enlisting in some degree the interest of the bird's human imitators. Many effective photographic illustrations are given, showing different phases of flight and different forms of wing; and the study of the subject should receive a desirable stimulus from Mr. Headley's simply-written and suggestive treatise.

That there is much still requiring to be learnt is fully acknowledged. We should have liked to see some attention shown to the variations of wing-formula as between different species of birds, with some suggestions as to their bearing on flight requirements. We can hardly doubt that some purpose is served by such variation, when we find, for instance, the third primary invariably the longest in the Common Redstart and the Whinchat, but the fourth in the Black Redstart and the Stonechat. Is it because the two last-named species make shorter migrations than their respective congeners that the apex of the wing is thrown back in each case by the breadth of one quill-feather? It would be of considerable interest to see the question discussed; but Mr. Headley probably deems the time not yet ripe. Again, is it of any importance to the Chiffchaff to have four of its primaries "emarginate," while the Willow-Wren has but three, and the Wood-Wren two? So far as we can see, the whole use of the distinction is to the ornithologist, who values it as a means of telling one of these little birds from another—especially if he safeguards his memory with the coincidence that the Chiffchaff's four emarginate primaries correspond with the four f's of its name, while the Willow-Wren's three correspond with its three w's, and the Wood-Wren's two with its two o's.

Mr. Headley devotes some interesting pages to the velocity of the migratory flight, which he believes to be far greater than that of the ordinary flight. This is probably true in the case of many species, for a bird during ordinary flight has seldom much motive for putting on its utmost speed. The ordinary flight of a Swift is certainly nothing to what it can do when in danger of being overtaken by darkness on its way home from a distant excursion. The author also believes that birds on migration frequently derive important assistance from a tail-wind, to get into which they may mount to extraordinary heights. Mr. Headley has collected a considerable number of interesting observations with an indirect bearing on this question, and a direct one on that of the height at which migrants fly. It must, however, be sufficiently clear that most migrants are able to dispense with this tail-wind assistance, however convenient they may find it on occasions.

The long-vexed question of the "soaring" power—rising, that is to say, in spiral circles without movement of the wing—is considered to have been definitely solved (as to a certain extent every one must admit that it has been) in favour of the simplest of the old conjectural explanations—the theory of ascending currents of air. The only difficulty that ever presented itself in the way of this solution was the want of evidence showing that upward currents are sufficiently frequent at the altitudes required; and this doubt the experience of aeroplanists has certainly tended to set aside.

In conclusion, we must add that when the author deviates now and then from the immediate subject of flight he is apt to stretch his own wings a little more freely than some would consider prudent in the realm of fancy. In his last paragraph he claims that the vocal powers of birds are the natural consequence of their power of over-sea flight. "After a flight of some thousands of miles, cock and hen must find one another somehow." And so the returned Nightingale "trumps forth to all the world the fact that he has arrived," and "thus we see that all a bird's activities must be viewed in connection with the fact that he has wings and is capable of long flights." It is, no doubt, a pretty association; but if we may side with those who hold that the song of the Nightingale has much the same meaning as the roar of the Lion and the bellow of the bull Moose—or even of our own Stag—the beautiful moral drawn by Mr. Headley must be a little wide of the mark. Indeed, it is remarkable that many of the loudest-voiced birds—as the Jay, the Peacock, and (in proportion to its size) the Wren—are among the least addicted to—and the least adapted for—migration in the groups to which they respectively belong.

C. B. M.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Meerkut from Mrs. Gosselin, Rabbits from Mr. L. F. Gurnell and Mrs. Standen, a Ring-dove from Mrs. Galloway, a Brown-headed Troupial from Capt. Quin, a Grass Snake from Dr. Killeen, and Slowworms and Newts from Mr. H. F. Traill. A Russian Brown Bear, a Black-faced Spider Monkey, and four Brown Capuchin Monkeys have been acquired by purchase or exchange.

For some time past the Monkey House has been without American representatives. The arrival of the "Spider" and the "Capuchins" is therefore especially welcome. The new Brown Bear is a young male, and a very agile climber.

BELFAST NATURALISTS' FIELD CLUB.

JULY 12-15.—EXCURSION TO THE COAST OF LOUTH AND THE BOYNE VALLEY.—The members travelled to Drogheda on the 12th inst. Twenty-seven members and friends participated in the proceedings. After lunch the party drove along the southern side of the Boyne estuary. A visit was paid to the church of Termonfeckin and its famous crosses. The drive was resumed to the village of Clogher. The party were conducted to the ancient ruined church and burying-ground, and then to St. Dennis's Well, from which a somewhat rugged walk over the headland brought them to the harbour, where they were entertained to tea by W. J. D. Walker, c.b. Afterwards the botanists and zoologists enjoyed a pleasant hour on Clogher Head before returning to Drogheda. Upon the cliffs of Clogher Head several interesting plants were noted, including the Sea Lavender (*Statice occidentalis*), the Sea Purslane (*Atriplex portulacoides*), and the Sea Spleenwort (*Asplenium marinum*). During the return drive to Drogheda the hedgerows yielded several plants of interest to northern botanists, among which may be mentioned *Rosa arvensis*, *Ballota nigra*, *Matricaria discoidea*, and *Ceterach officinarum*. During the day thirty-nine species of birds were observed. The four common species of woodlice were seen as well as the Pill-woodlouse (*Armadillidium vulgare*), and the finding of *Trichoniscus pygmaeus* added a species to the recorded fauna of County Louth. On the sand dunes to the south of Clogher the landshell *Helix pisana* reaches its most northerly habitat.

Leaving Drogheda on the morning of the 13th inst., the party drove westward. A halt was called at the obelisk marking the site of the battle in 1690, to enable the members to inspect this historic place, and some of them visited Schomberg's grave on the southern side of the river. Thence on to Slane, where the party was conducted to St. Patrick's Hill, where about an hour was devoted to an examination of the ancient remains. Afterwards some walked and others drove to Beauparc, Sir G. Francis W. Lambert, Bart., having courteously granted permission for the exploration of his beautiful demesne. The contortions of the Carboniferous limestone cliffs on both sides of the river here formed a topic for discussion. After a tour of the gardens, the return to Drogheda along the south bank was commenced. In the evening the usual business meeting was held, the president (Rev. Canon Lett, M.A., M.R.I.A.) in the chair.

The zoologists were rewarded by finding the Pigmy Woodlouse (*Trichoniscus pygmaeus*) in the woods of Beauparc, this being the first record for this species from County Meath, as is also *Trichoniscus roseus*, found in the gardens, but it is possible that the latter may be an artificial introduction. It was taken, however, in County Meath on the following day by the river-side at Kells in an apparently natural habitat.

There was no fixed programme for Sunday, the 14th inst., and several of the members visited the many places of interest in Drogheda, others the celebrated tumuli of Dowth and Newgrange. The conchologists made pilgrimage to Temple demesne, at Collon, co. Louth. the first known locality for the land-shell *Vitrina hibernica*. They were rewarded by finding it alive in abundance under dead leaves and twigs in all stages of

growth. Returning from Collon by Mellifont, this rare shell was taken on the Meath side of the Mattock River, opposite the famous abbey, thus extending its known range into a second county division. The botanists with this party noted the alien *Medicago falcata* near Collon in Meath, and *Rubia peregrina* near Monasterboice.

Seven o'clock on the morning of the 15th inst., saw a group of members wending their way to a gravel pit, where an hour was spent by the geologists in noting the somewhat peculiar stratification of the sands and gravels. Subsequently the train was taken for Kells, and on arrival there the members were conducted to the church. In the churchyard stand the remains—about ninety feet high—of a round tower and several richly-decorated crosses. The next object visited was the stone-roofed cell or chapel known as St. Columbkill's House.

From here some of the members made a detour to view the well named after the same saint ere proceeding to visit the Cross of Kells. The time at disposal after lunch was spent in exploring the town ere entraining at 3.40 for Drogheda, whence during the evening the party left for their various destinations. *Carex pendula*, which occurred in the woods of Headfort Castle, is worth noting. The mollusks *Helix hortensis* and *Pyramidala rupestris* were the only ones of interest seen at Kells, both species occurring in the graveyard at the round tower, while the latter was also common in the crevices between the stones on St. Columbkill's House.

During the visit, fifty-eight species of birds were observed, and it is interesting to record that here at least the Goldfinch is common, many of these beautiful birds being noted throughout the district.

AUGUST 3.—ARCHAEOLOGICAL SECTION.—About thirty members and friends paid a visit to Ardglass. First visiting the old Church of Ardtole which was described by Mr. W. J. Fennell, the party, under the guidance of Mr. W. N. Kinny, visited St. Patrick's Well, and then made their way to Castle Shean, formerly known as Jordan's Castle. This has been restored by Mr. F. J. Bigger, who entertained the party to tea, and provided a programme of Irish jigs and reels danced on the flat roof of the castle to the music of Irish pipes and fiddles.

SEPTEMBER 7.—GEOLOGICAL SECTION. EXCURSION TO THE GIANT'S CAUSEWAY.—Travelling from Belfast by the noon express the party met on arrival some members of the Club staying at Portrush, also some members of kindred societies from Birmingham and Bournemouth. Arriving at the Causeway by electric tram they were met by Mr. Wm. Traill, who pointed out the geological features in detail and gave a short talk on the geology of Co. Antrim generally. He controverted strongly the opinion held by Messrs. Cele and McHenry that the "Red Bed" between the Upper and Lower Basalts was merely the disintegration of the basalts forming the surface of the older series. He (Mr. Traill) believed it to be an independent ash bed or a liquid mud eruption, similar in source to the immense pumice beds found in the Canary Islands, and some other volcanic areas. After this followed a period of quiescence during which vegetation flourished. After a walk along the cliff path, where numerous minerals were collected, the party returned to Portrush for tea at the White House Hotel before leaving for home by the 8 o'clock train.

NOTES.

BOTANY.

A Note on the Robertsonian Saxifrages.

I have never been able to follow the splitting of *Saxifraga umbrosa* and *S. Geum* into the several species or varieties which at various times have been described—*S. serratifolia* Mackay, *S. elegans* Mackay, *S. hirsuta* L., *S. punctata* Haw. These are all forms connected by many intermediates. As has often been pointed out they are characteristic of places where *S. umbrosa* and *S. Geum* grow together. I cannot regard them as connecting links between the two, which seem to me to be quite distinct species; and I think that the botanist who studies them in the field will soon come to the conclusion that they are of hybrid origin. The "splitter" who wants to coin half-a-dozen "species" quite as good as those named above, need only go to certain places in Kerry, such as Connor Hill, to find ample material for his ingenuity; and it seems to me that the describing of such a "new hybrid" as *S. Geum* var. *serrata* × *umbrosa* var. *serratifolia*, as my friend Mr. Marshall has recently done (*Journ. Bot.*, June, 1912) is a mere waste of time. Several "new hybrids" have from time to time appeared spontaneously in my garden, where the two species—wild plants from Galway and Kerry—grow together; and I am now growing a beautiful series of intermediates, representing every gradation from type *umbrosa* to type *Geum*, collected by the roadside at Connor Hill Pass, a few months ago. In the present note I merely wish to emphasize certain circumstantial evidence which appears strongly in favour of the hybrid origin of all the intermediate forms; of course the only conclusive proof of the same will be their production in the garden by artificial crossing, and I do not doubt that this can be done by everyone who takes the trouble.

In the first place, *S. umbrosa* is, in nature, an extremely stable species. In Galway and Mayo, for instance, one may examine thousands of specimens without detecting any noticeable variation, except that occasionally the toothing of the leaves is accentuated. In Donegal and on the Blaskets, likewise, where *S. Geum* is absent, the plant remains quite typical. But here is an interesting point. In all Galway and Mayo, just one small patch of *S. Geum* is known—namely, on the great cliff on Clare Island, where *S. umbrosa* is also abundant; and within a few yards of it, and nowhere else, there occur a few plants of a form just intermediate between the two species. Similarly, when we cross the Blasket Sound towards Brandon, the advent of *S. Geum* is accompanied by the appearance of a swarm of puzzling "varieties." It seems to me that the only chance of escape from the hybrid theory lies in the assumption that *S. Geum* is a very variable species. Unfortunately, we have no place in Ireland where *S. Geum* is present and *S. umbrosa* absent, in which this theory can be tested; but the occurrence of every gradation from *Geum* to typical *umbrosa* to my mind puts this theory out of court. Of course each particular hybrid keeps "thoroughly constant" in cultivation (a point put forward by Mr. Marshall in favour of the subspecific rank of *S. serratifolia*);

why should it not ? But what are its children like ? I may add that by crossing *S. umbrosa* and *S. Geum*, Mr. C. F. Ball has produced at Glasnevin a hybrid which is to all purposes identical with the one mentioned above as found on Clare Island.

R. LLOYD PRAEGER.

Dublin.

Spiranthes autumnalis in the Phoenix Park.

In the *Irish Naturalist* for 1906 (p. 279) I recorded the finding of three plants of *Spiranthes autumnalis* in the old locality in the Phoenix Park, where it was stated to grow in Miss Baily's " Irish Flora " (1833), but where so far as Mr. Colgan was able to inform me, it did not seem to have been noticed since. I now write to say that I have in most years since 1906 looked it up in the same locality—in 1907 I found as many as 34 flowering spikes, and on August 30th of the present year I counted 38, so the little orchid's hold on the old ground is not so precarious as I imagined in 1906, when I could only discover 3 spikes.

C. B. MOFFAT.

Dublin.

ZOOLOGY.

Woodlice from the Great Blasket, South Kerry.

Amongst other animals which I collected on the Blaskets in June of this year were the following terrestrial isopods. Mr. Nevin H. Foster, M.R.I.A., has kindly identified the species :—*Trichoniscus pusillus* Brandt.—Common in the damper parts of the cliffs, otherwise rare. *Philoscia muscorum* (Scopoli).—Generally distributed and common. *Oniscus asellus*, Linn.—Also common all over the island. *Porcellio scaber* Latreille.—Only locally common.

All the above four species were taken by me on Beginish also, where both *T. pusillus* and *P. scaber* were more abundant than on the Great Blasket.

A. W. STELFOX.

Belfast.

Kestrel and Magpie.

Mr. Pentland, in his article on the Louth fauna, *supra*, pp. 145-8), mentions that both the Magpie and the Kestrel have, from unknown causes, become much less common than formerly. The decrease of the Kestrel in Louth may, I think, be a result of that of the Magpie ; for the former bird, in inland districts, almost invariably rears its young in the nests built by the latter. Hence the spread of the Magpie promotes the extension of the Kestrel's range ; and it seems from Mr. Pentland's observations that the decrease of the Magpie has actually had—as might have been expected—the opposite effect of thinning the Kestrel's numbers.

Dublin,

C. B. MOFFAT.

Yellow Wagtail on the Tuskar Rock.

I collected on Monday morning, August 26th, 1912, at 6 a.m., and again on Wednesday, August 28th, also at 6 a.m., a Yellow Wagtail (*Motacilla Raii*) on the Tuskar Rock, and the more I compare it with the Wagtail I obtained on the 12th September last, the more I am convinced that the latter bird is an example of the Blue-headed Wagtail (*Motacilla flava*). My fellow-worker on bird-migration, Mr. Barrington, will, no doubt, be interested to read this note.

C. J. PATTEN.

Tuskar, Co. Wexford.

Barred Warbler at Rockabill.

A Barred Warbler (*Sylvia nisoria*) killed striking at Rockabill lighthouse, on 17th September, at 2 a.m., has just been received in the flesh. The other two Irish records are Co. Mayo. September 24th, 1884, in National Museum, and Rockabill, September 25th, 1896, in my collection.

This species has not so far been noticed on spring migration—either in Ireland, or at Fair Isle or the Isle of May, in Scotland.

RICHARD M. BARRINGTON.

Fassaroe, Bray.

Wryneck on Aran Island.

I received on September 22nd, a Wryneck from the north Aran lighthouse, co. Galway—killed striking on Sept. 19th—being the seventh Irish record—and the second from this station. Details of the other occurrences are given in *Irish Naturalist*, 1896, p. 16. There is only one spring record.

RICHARD M. BARRINGTON.

Fassaroe, Bray.

Adolescent Purple Sandpiper from the Tuskar Rock.

On Monday, August 5th last, I obtained a Purple Sandpiper in that interesting plumage which closely resembles the true nuptial garb, so that I designate it “nuptialoid.” In the case of this Sanderling, I have insisted that such a plumage exists (Report Brit. Assoc., Winnipeg, 1909), and that birds in this garb remain throughout the summer in Ireland. The very early date at which I have now secured the Purple Sandpiper and the plumage it exhibits affords strong evidence that the bird remained all the summer on our coast, and brings this characteristic habit of Limicoline birds into closer line one with another.

C. J. PATTEN.

Tuskar, Co. Wexford.

Grasshopper-Warblers from Tuskar Light-station.

At midnight on Monday, July 22nd, a Grasshopper-Warbler was obtained by Mr. O'Leary, light-keeper, as it fluttered on the lantern glass, and on Wednesday, September 11th, at 10.25 p.m., I captured another as it skulked on the balcony.

C. J. PATTEN,

Tuskar, Co. Wexford.

Avocet at Lough Swilly.

About the middle of October, 1911. Mr. J. Swan shot an Avocet (*Recurvirostra avocetta* Linn.), at the mill-dam, Buncrana, Lough Swilly. The bird had frequented the dam for some days along with other invaders before it fell a victim to the gun. It was seen in the flesh by my friends, Messrs. R. & W. Logan, and from what they have told me the identification is undoubted.

D. C. CAMPBELL,

Londonderry.

GEOLOGY.

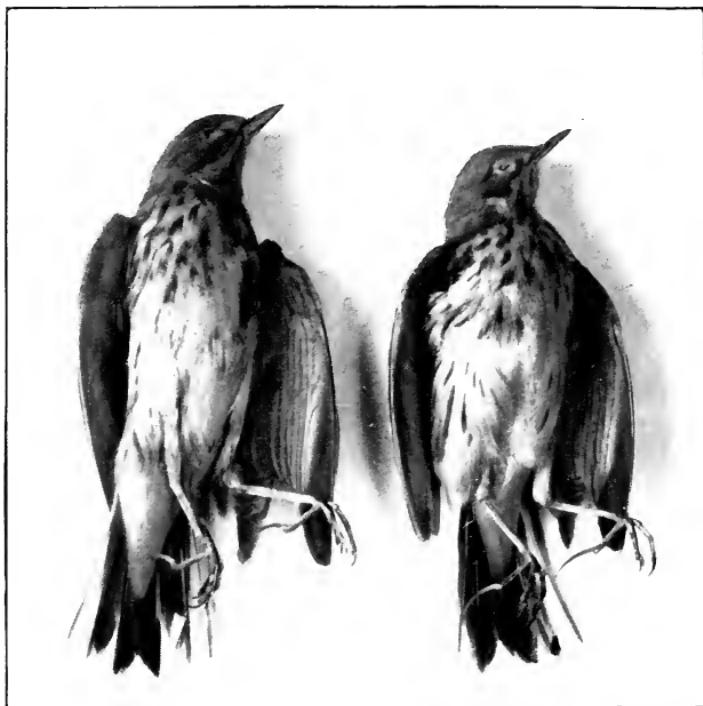
An Old County Dublin Mine.

Do any readers of this Journal know anything of the spot known as the "mine hole," on the beach, half-way between Dalkey and Killiney? It is apparently a worked-out vein occurring at the junction of the slate and the granite. I got in recently as far as its second branching, some sixty-five paces from the entrance, but not being prepared to wade, did not go any farther, though the water did not seem very deep. About twenty-five paces from the entrance, are two passages starting from a small chamber on the right, the first ends after five yards in a six-foot drop into a pool of water, by the main passage one has just left, the other terminates a curved course of about twenty paces in a sort of shallow well. There is no mention of it in the Memoir of the Geological Survey dealing with Sheet 112, though it describes this part of the beach rather minutely. The beach in front of the cave is strewn with specimens of the andalusite mica schist, mentioned in the Memoir. This absence of mention may be due to the fact that years ago the entrance was closed by an iron gate, which has disappeared. I am told the entrance at present forms the abode of an old man who has lived there for some time, and that other exits may be seen some distance inland.

Perhaps it might be of sufficient interest to some geologists to explore and give us an account of it. Can anyone say what is the origin of the subterranean passages, lighted from above, and connected with a "holy well" near the convent at Dalkey?

F. HYDE MABERLY,

Crosshaven, Co. Cork,



A

B



C

TREE PIPITS (A, C) AND MEADOW PIPIT (B), FROM TUSKAR ROCK.

DISCOVERY OF THE TREE-PIPIT
ON THE TUSKAR ROCK, CO. WEXFORD.

A NEW BIRD FOR THE IRISH LIST.

BY PROFESSOR C. J. PATTEN, M.A., M.D., SC.D.

(PLATE 4.)

At 6.12 a.m. on Tuesday, September 10th, 1912, I collected a Tree-Pipit (*Anthus trivialis*), the first example, as far as I am aware, that has been obtained in Ireland. The morning, while fine, was rather overcast, and the wind, coming from the north, blew with the force of a moderate breeze. The bird, as its head, shoulders, and breast appeared over a conical projection of rock, was not by any means well lit up, the grey colour of its upper plumage blending to a considerable extent with the surroundings. The whitish under parts, *i.e.*, lower breast and abdomen were hidden from view. As I looked at the bird, I was not at all sure as to the species to which it belonged. I believed, however, that it was one of two birds, either a Meadow-Pipit or a Wheatear. From its coloration it appeared like the former, but in its bearing it seemed to resemble the latter, especially as it stood up and peered at me from one spot. It did not move hither and thither as one so often sees a Meadow-Pipit doing directly it alights on the ground. I had no occasion to collect another Wheatear that morning, having many on hand, but I was anxious to increase my collection of Meadow-Pipits. To ascertain which of these two suspected species the bird might be, I put it to flight, and took my chance that it would not leave the rock. Directly it rose I saw it was no Wheatear, the conspicuous white rump, which at once secures the identification of this species when flying, being absent. After a very short flight of about fifteen yards, the bird again settled down, and now with doubts still in my mind, but inclining to the idea that it was only a quiet and silent Meadow-Pipit, I decided to collect it. On picking it up and glancing casually at it I certainly did take a note of the shade of colour of the upper parts, which

I could see differed from the shade of the upper parts of many Meadow-Pipits which I had collected at this season of the year on the Tuskar. However, my suspicions were not as yet aroused. I merely thought such a plumage variation was the outcome of difference in age. And so I put the bird up in my room for a few hours until I had completed my morning's survey of the rock. At 9.0 a.m. I collected another Pipit, which possessed the same shade of plumage as those previously taken this autumn. At 11.0 a.m. I placed the two birds side by side for purposes of comparison. The following points of difference could be made out without any difficulty :—*First bird*—larger in size, darker in the upper plumage, spots on the breast bolder and comparatively fewer in number (the breast being more like that of a thrush), legs not only much paler but without any yellow tinge, the colour being a very delicate pale flesh-colour, almost like ivory-white with the faintest trace of pale pink in it. Now, while these points of difference were of considerable interest, they did not as yet stir up any suspicions in my mind that I was dealing with two different species. Next I compared the beaks, and certainly the more strongly built beak of the first bird (a beak more like that of a Sky-Lark than of a Meadow-Pipit), arrested my attention for some time. Still, I thought this feature might be the result of age, and that the bird was naught else than a very robust and fully-matured Meadow-Pipit, and differing in that respect from all the other Meadow-Pipits which I had heretofore collected this autumn, which were immature. Admiration for the beautifully delicate flesh-coloured tint of the legs prompted me to inspect them a second time. And now, my examination was conducted with more critical scrutiny, for I soon detected that the hind-claw was much shorter and more curved than that of any of the Meadow-Pipits which I had as yet collected. Then, all of a sudden, it flashed into my mind that I had secured a prize ; the bird was no less than a Tree-Pipit. To strengthen my conviction I hastily snatched down Saunders' "Manual" from a shelf, and went over the distinguishing points, and very soon I found my bird must

be a Tree-Pipit, so exactly did it answer to the description given by this reliable writer. Moreover, I am familiar with the appearance of the Tree-Pipit at Sheffield, where the bird is common in summer.

Without delay I proceeded to obtain a photograph of the bird in the flesh, and exactly on the spot of the rock where I first picked it up. The bird was lying somewhat in the position depicted in the illustration, (Plate 4 A), the left leg and wing being broken were displaced outward and lay pendant. This convenient pose shows not only the short hind-claw in profile, but also the tip of the same resting on the long inner secondary feathers of the wing. The latter, it will be noticed, are as long as the primaries, while in the case of the Meadow-Pipit they are usually a shade shorter, though indeed I have found considerable variation in this direction, and would not lay too much stress on this point. The two outer feathers of the tail are spread to show the characteristic pattern of the brown and white markings. In the second outer feather there is less white than is usually found in that of the Meadow-Pipit. Here, again, the test is not absolute, indeed I have found much variation in the extent of the white of the second outer tail-quill in the Meadow-Pipit. I next photographed the Tree-Pipit and Meadow-Pipit side by side, using a white background, and I posed both birds alike. (Plate 4 A, B.) A glance at the illustration will show the distinctive characters of the two species which I have already pointed out. The following particulars I have made out in regard to this interesting specimen:—*Length*—15·85 cm. *Wing*—8·4 cm. *Weight*—5 drams and 48 grains. *Condition*—Very good, much fat present. *Gizzard*—Quite empty. *Plumage*—Moulting from first autumn to first winter garb. *Age*—Immature; bird of the year. *Sex*—Female.

At 9 a.m. on Sunday, September 22nd last, the weather being fine, and a fresh E.S.E. wind blowing, I obtained a second Tree-Pipit on the Tuskar Rock, and as in the case of the capture of the first specimen I was not at all sure what the bird was until it came to hand. Unlike the first Tree-Pipit, which remained quietly looking at me from the one spot where it alighted, this second bird,

directly I espied it, was walking to and fro over a patch of dead sea-weed, now and again stooping to pick something up to eat. The bird saw me approaching, but evinced little fear at my presence ; it only retreated from me a few yards, stopping to pick at the sea-weed when I ceased following it. Having a full view of it, and the light being good this morning, I was able to surmise by its form, general pattern of plumage, and its ambulatory movements, that it must be a Pipit of some sort. However, it was tamer, stood higher, looked larger and darker, than a Meadow-Pipit, walked with more deliberation and more slowly than the Meadow-Pipit is wont to do, and was quite silent, whereas the Meadow-Pipit, more often than not, chirps when moving about on foot. Taking all these points into consideration I deemed it wise to collect this bird on suspicion of its being a strange species. This it turned out to be, for before I even picked it up I saw by its flesh-coloured legs, characteristic short and curved hind-claw, the latter very distinct from the long "spur" of the Meadow-Pipit, and by its robust beak, that it was truly another Tree-Pipit. Then without disturbing it from the pose it assumed when it fell, and before *rigor mortis* had time to set in, or the cornea of the eye to pucker and sink,¹ I secured a photograph of my bird in the flesh, taken five minutes after death had ensued. The figure reproduced (Plate 4c) from this photograph portrays the bird lying lifeless on the drift sea-weed, among which a few minutes before it had been foraging for food. On examining this specimen I find it differs from the first Tree-Pipit obtained in being slightly smaller, its wings are slightly shorter proportionately, and it is lighter in weight. Unlike the first bird its condition is rather poor, though its gizzard is full of food stuffs ; the gizzard of the first was empty, though the bird was well nourished—indeed fat. The particulars similar to these made out for the first specimen are summarised as follows :—*Total length—15·7 cm. Wing—7·9 cm.*

¹ The glassy front (cornea) of a bird's eye begins to shrink or pucker in an hour or less after death, and this greatly detracts from the beauty of a fresh dead specimen in the flesh.

Weight—4 drams, 1 grain. *Condition*—Rather poor. *Plumage*—Moulting, from first autumn to first winter garb. *Age*—Immature bird of the year. *Sex*—Female. *Gizzard*—Full of insect remains.

Now that I have the pleasure of placing this long-expected and welcome species on the Irish List, and have been fortunate in capturing not only one, but two specimens, obtained on emigration at different dates in September, 1912, an interval of twelve days elapsing between the two captures; and believing that each of these two specimens represents only a single bird secured from several of their own species which accompanied them (though, perhaps, their companions avoided the Tuskar Rock or lantern); and inasmuch as these two specimens taken at the Tuskar light-station show no indications of having been storm-driven, half-starved, or even temporarily exhausted; and bearing in mind that the meteorological conditions (especially in regard to the direction of the wind) were quite different on the days that they were captured, so that one cannot argue that these birds were coming from a certain focus, and had been blown out of their course; the probabilities are that these, and other Tree-Pipits which passed by unobserved, were emigrating from Ireland. It now remains for ornithologists resident in Ireland to set to work and use every effort to prove that the Tree-Pipit is a regular visitant during the summer, and to obtain authentic evidence that it breeds in Ireland. It is indeed likely that the Tree-Pipit, such a common and widespread annual summer migrant to England, occurs annually as a summer migrant to Ireland.

Tuskar Lighthouse, Co. Wexford.

DESCRIPTION OF PLATE 4.

A : Tree-Pipit, collected September 10th, 1912.

B : Meadow-Pipit, collected same day.

It may be observed that of the two, A is the larger bird, and possesses the stouter beak, and shorter and more strongly curved hind-claw.

C : Tree-Pipit, collected September 22nd, 1912.

This bird is seen lying on the drift sea-weed on which it had been foraging for food. Its short and strongly curved hind-claws shew up clearly against the background.

SOME INTRODUCED PLANTS IN KERRY.

BY REGINALD W. SCULLY, F.L.S.

IN Mr. Praeger's interesting Notes on the Flora of the Blasket Islands which appeared in the September issue of the *Irish Naturalist*, he refers to the occurrence of *Matricaria discoidea* on the neighbouring mainland, and expresses a doubt as to its having been previously recorded from Co. Kerry.

The plant was first noticed in the county by the present writer in 1902, and duly recorded in the *Irish Naturalist*, 1903, p. 114.¹ So fast, however, has this aggressive alien spread over the county in recent years, that it appears desirable to put its distribution there on record, as ascertained to the autumn of the present year. The opportunity may be taken to draw attention to the present range of several other introductions, some of them spreading in the county, others just maintaining a precarious footing, and quite at the mercy of the first unscrupulous gatherer.

MATRICARIA SUAVEOLENS Buchenau (*M. discoidea* DC.).

Kerry N.—In some plenty about a gateway and adjoining field side, rather more than a mile west of Beale Point, on the Ballybunnion road, 1902; R.W.S. (*Irish Naturalist*, 1903, p. 114). In great plenty about the Tralee fair field, spreading to the adjoining roadsides and railway grounds, &c., 1908, and abundant on and about the Killorglin fair green, 1911; R.W.S. *Kerry S.*—By the roadside near Anascaul village, 1911; Messrs. Stelfox and Welch. About Castlegregory and abundant at Deelis, 1912; Messrs. Praeger and Stelfox—the last three localities are in the Dingle peninsula. Sparingly on the fair field at Cahersiveen, and abundantly at Portmagee, especially on its east side, 1911; Miss Delap and R.W.S. In some quantity in the village of Sneem; James Britten (*Journal of Botany*, 1912, p. 288).

All the above localities are on or near the sea coast, and while most of them have rail connections and an extensive

¹ I referred to *M. discoidea* *sensu stricto*, not to *M. occidentalis*, to which Mr. Scully's previous record refers.—R.L.P.

traffic in cattle, others like Beale Point and Portmagee are some distance from the nearest railway, and have little traffic of any description. So far, the three important inland towns, Listowel, Castleisland, and Killarney, appear to have quite escaped this alien. *Matricaria suaveolens* is now on record for nearly three-fourths of the forty divisions of *Irish Topographical Botany*, and considering that it was first recognised in Ireland by Mr. Colgan so recently as 1894, it affords an instance of plant-invasion probably unequalled in modern times.

DIPLITAXIS MURALIS DC.

This is another recent arrival in Kerry, and is increasing there; it is a well known lover of railway tracks, and gravelly or waste places.

Kerry N.—It was first noticed by the present writer in 1902 at Ballyheigue and recorded in the *Irish Naturalist*, 1903, p. 114; it occurred then very sparingly at the foot of a roadside wall, but was seen there in greater quantity five years later. In 1906, it was found near Fenit pier on Tralee bay, and in 1909 was noticed in some plenty on the railway bank near Killarney; R.W.S. *Kerry S.*—Sparingly on the railway near Cahersiveen, and again at Reenard Point, opposite Valencia Island, 1910; Miss Delap.

This plant appears to be spreading rapidly in the south of Ireland, chiefly along the railways, and has, no doubt, come to stay in Kerry.

LACTUCA MURALIS Gaertn.

As far back as 1888 this plant was noticed by the writer as quite established about the ornamental grounds of Glenflesk Castle, a mile and a half east of Killarney, and its occurrence there recorded in the *Journal of Botany*, 1890, p. 114. As this is one of the rarest plants in Ireland, its presence in Kerry, even in an introduced state, is of great interest, and its behaviour in the above locality has been carefully watched. When first noticed it occurred principally beside walls and walks, with some scattered plants on a shady bank, and among ornamental shrubs. It varied greatly in quantity from year to year, sometimes being reduced to a couple of dozen plants, in other years reaching three or four times that number, the chief cause of

these ups and downs being the unkind attentions of the weeding gardener. Fortunately it has now spread to rather safer situations, and has taken a firm hold of walls and out-buildings. It is only, however, within the last five years that the *Lactuca* has shown any decided tendency to increase its somewhat restricted area by spreading to the adjoining plantation, and when the locality was visited last July, more than a hundred plants were seen scattered over a space roughly fifty yards square. This remained the only locality in which the plant was seen in the county until 1908, when two flourishing tufts were noticed on and at the foot of the railway wall beside the Killarney station. A new siding has since been made which swept away the greater portion of these plants, but in July of this year they were again established there.

Introduced plants and shrubs surround both these Kerry stations for the *Lactuca*, and as it appears to be quite absent from the more remote and unplanted portions of the county, many of them quite suitable for its growth, this plant can have no claim to be considered a native in Kerry.

The above three plants are examples of introductions with a tendency to spread, the two following are illustrations of how persistently an introduced plant will cling to a very restricted area when once established, even if its surroundings appear to limit its expansion.

DIANTHUS PLUMARIUS L.

In 1856 the Rev. W. M. Hind recorded *Dianthus plumarius* in the *Phytologist* as growing "in considerable quantity" on one of the limestone headlands jutting out into the Lower Lake, Killarney. When first noticed by the present writer in Mr. Hind's locality, now several years ago, the plant was certainly not "in considerable quantity," a patch extending over perhaps a square yard of ground was all that could be found; when last seen, however, in July of the present year, the patch had not appreciably diminished so far a period of probably well over sixty years, a member of this xerophytic family has maintained its position in the moist surroundings of the Kerry climate, and unless interfered with will, no doubt, remain there for many decades to come.

VERBASCUM VIRGATUM Stokes.

The most marked example, however, of this plant persistence in the Kerry flora is the presence near Kenmare for more than one hundred years of *Verbascum virgatum*, Stokes, a species unknown elsewhere in Ireland in an established state. As long ago as 1806 Mackay recorded *Verbascum pulverulentum* as found by Mr. George Clark in 1804 in a locality near Kenmare. When examining this district about twenty years ago, several plants of *V. virgatum* were found in the locality indicated, and as *V. Thapsus* does not grow in the immediate neighbourhood, there can be no reasonable doubt that *V. virgatum* was the species really referred to in Mackay's record. It was seen there as late as July of this year, as usual in very scanty quantity, the largest number of plants noted in any year being about a dozen, the smallest only one or two. It should be remembered that this is not a case of the survival of a perennial tuft, as with the *Dianthus*, but of the constant renewal by seed of a biennial for at least 108 years.

Among introductions which show a tendency to spread in Kerry may be mentioned *Mimulus Langsdorffii*, already thoroughly established in the neighbouring county of Cork, and *Fuchsia Riccartonii*, a striking ornament in many of the western portions of the county. *Juncus tenuis*, if really introduced, and the present writer is inclined to give it native rank in both Kerry and Cork, appears to be about stationary. In one outlying locality of limited extent the tufts of the Rush were counted and have been kept under observation for a period of 18 years without any appreciable alteration in quantity being noted, although the locality was quite suitable for a wide extension of its range.

Two instances of attempted colonisation and failure may be given before bringing these notes to a close. In 1902 *Crepis biennis* was abundant in a meadow near the Spa village, Tralee Bay; in the following year it had dwindled to a few plants, and since 1903 it has not been seen either there or elsewhere in the county. In the same year *Valerianella carinata* was found in abundance on roadside walls and banks near Ballyheigue, it, too, has now quite disappeared from this its only known Kerry station.

NOTES ON BIRDS OBSERVED AT BUNDORAN.

BY NEVIN H. FOSTER, M.R.I.A., M.B.O.U.

During a fortnight (12th till 26th August) spent this year at Bundoran, Co. Donegal, I was enabled to make some ornithological observations which may be worthy of recording.

On the 21st a flock comprising both Whinchats (*Pratincola rubetra*), and Stonechats (*P. rubicola*), with a few Yellow Buntings (*Emberiza citrinella*) and Reed-Buntings (*E. schoeniclus*) was seen. These birds were very tame and permitted a close approach, whilst they were busily engaged feeding in a weedy field about a quarter of a mile inland.

On the day of my arrival, and during the two succeeding days, the shore in the vicinity of the mouth of the Bradoge River was tenanted by about forty Wagtails. Of these some twenty I diagnosed as White Wagtails (*Motacilla alba*), the remainder consisting of Pied Wagtails (*M. lugubris*) and Grey Wagtails (*M. melanope*) in about the proportion of three Pied to one Grey. As would be expected, the Grey Wagtails frequented almost exclusively the immediate vicinity of the river, whilst the others spread themselves along the shore as far as the cliffs on either side of the river. By the 15th these White Wagtails had all disappeared, but till the end of my stay the Pied and Grey Wagtails still frequented this stretch of the shore in approximately the original numbers. I think there can be no doubt that these White Wagtails were on their southward migration, thus confirming other observations on the west coast of Ireland at this season.

Although closely watching for it, I failed to see the Tree-Sparrow (*Passer montanus*), but this may not be surprising when the weather condition is taken into account—it being for the most part cold and stormy, and land birds as a rule being conspicuous by their absence. For example, it may be cited that only a single Song Thrush and two Blackbirds were observed during the fortnight, yet my list included 36 species of passerine birds. Of the Finches the most

numerous species proved Linnets (*Linota cannabina*) and Twites (*L. flavirostris*), while one Goldfinch (*Carduelis elegans*) was seen in a natural state. Judging from the number of Goldfinches seen in cages in this neighbourhood, many of these birds must fall a prey to bird-catchers.

At a corresponding period at Bundoran, in 1909, only a single Swift (*Cypselus apus*) was noted, but on this occasion two Swifts were seen on the 14th, five on the 15th, and three on the 17th.

Every day Turnstones (*Strepsilas interpres*) were observed on the shore, in company with Ringed Plovers (*Aegialitis hiaticola*) and a few Redshanks (*Totanus calidris*). As many as forty Turnstones were counted, a few of them still retaining more or less of the chestnut colour on the mantle indicative of the adult summer plumage. A visit to Tullan Strand on the 16th revealed three Sanderlings (*Calidris arenaria*), and on revisiting this locality on the 19th about twenty of these birds were feeding by the margin of the incoming tide.

On the strand at the mouth of the River Erne was observed a party of Little Terns (*Sterna minuta*), both mature and immature, and it may be of interest to note that some of the mature birds displayed a roseate tint on the breast when viewed in the then prevailing bright sunlight, a feature which was observed a few years ago by Mr. Robert Patterson in these birds at Pollan Bay on the eastern peninsula of Donegal.

The total number of species of birds observed during the fortnight amounted to 69, but I only give my notes on those which may be considered most interesting from the stand-point of a student of distribution.

Hillsborough, Co. Down.

SOME IRISH ENTOMOSTRACA.

BY EDWARD POPPLE.

In January last the Rev. Canon Norman, F.R.S., handed to me some small collections of freshwater Entomostraca, which he had gathered during a visit to Ireland in June, 1900. There were five small tubes from Monaghan, and three from Galway. On working through them I find twenty-five species of Entomostraca, of which two Harpactids, *Canthocamptus horridus* S. Fischer, and *Canthocamptus gracilis* G. O. Sars are, I believe, new records for Ireland.

The following is a full list of the species :—

CLADOCERA.	COPEPODA.
<i>Latona setifera</i> Müller.	Cyclopidae.
<i>Daphnia hyalina</i> Baird.	<i>Cyclops viridis</i> Jurine.
<i>Simosa vetula</i> O. F. Müll.	<i>bicuspidatus</i> Claus.
<i>Acroperus harpae</i> Baird.	<i>serrulatus</i> Fischer.
<i>Alonopsis elongata</i> G. O. Sars.	<i>affinis</i> Sars.
<i>Lynceus affinis</i> Leydig. rostratus Koch.	<i>phaleratus</i> Koch.
<i>Alonella excisa</i> Fischer. nana Baird.	Harpactidae.
<i>Pleuroxus trigonellus</i> Müller.	<i>Canthocamptus minutus</i> Müller.
<i>Chydorus sphaericus</i> Müller. barbatus Brady.	<i>lucidulus</i> Rehberg. <i>crassus</i> G. O. Sars. <i>horridus</i> S. Fischer. <i>gracilis</i> G. O. Sars. <i>pygmaeus</i> G. O. Sars.
OSTRACODA.	Calanidae.
<i>Cyclocypris laevis</i> Müll.	<i>Diaptomus gracilis</i> G. O. Sars.

The following lists show the localities :—

CORNACASSA, NEAR MONAGHAN.

<i>Daphnia hyalina</i> Baird.	<i>Cyclops phaleratus</i> Koch.
<i>Chydorus sphaericus</i> Müller.	<i>Canthocamptus horridus</i> S. Fischer.
<i>Cyclocypris laevis</i> Müller.	<i>pygmaeus</i> G. O. Sars.
<i>Cyclops bicuspidatus</i> Claus.	

ROSSMORE, CO. MONAGHAN.

<i>Alonella nana</i> Baird.	<i>Canthocamptus minutus</i> Müller.
<i>Pleuroxus trigonellus</i> Müller.	<i>gracilis</i> G. O. Sars.
<i>Chydorus sphaericus</i> Müller.	<i>pygmaeus</i> G. O. Sars.

BRAGAN, MONAGHAN.

Daphnia hyalina Baird.	Cyclops serrulatus Fischer.
Simosa vetula Müller.	phaleratus Koch.
Lynceus rostratus Koch.	Canthocamptus lucidulus Rehberg.
Alonella nana Baird.	crassus G. O. Sars.
Chydorus sphaericus Müller.	pygmaeus G. O. Sars.
Cyclops viridis Jurine.	Diaptomus gracilis G. O. Sars.

KYLEMORE LOUGH, CO. GALWAY.

Latona setifera Müller.	Cyclops viridis Jurine.
Acroperus harpae Baird.	bicuspidatus Claus.
Lynceus affinis Leydig.	affinis G. O. Sars.
Alonella excisa Fischer.	Canthocamptus minutus Müller.
Chydorus sphaericus Müller. barbatus Brady.	horridus Fischer.
Diaptomus gracilis G. O. Sars.	pygmaeus G. O. Sars.

BALLYNAHINCH, CO. GALWAY.

Alonopsis elongata G. O. Sars.	Canthocamptus crassus G. O. Sars.
Lynceus affinis Leydig.	pygmaeus G. O. Sars.
Cyclops bicuspidatus Claus,	

Great Berkhamsted.

N O T E S .

ZOOLOGY.

Chitonactis coronata (Gosse) on the Dublin Coast.

Irish records for this elegant little sea-anemone appear to be confined to those given by Miss Jane Stephens in her "List of Irish Coelenterata" (*Proc. R. I. Acad.*, 1905) for our south-west coast, where it has been taken three times in from 50 to 200 fathoms. The species occurred to me quite unexpectedly in a shallow-water dredging in 8 f. off the mouth of Bullock Harbour, Dublin Bay, on the 24th September last. Eight specimens, five of them quite juvenile, were taken. They ranged from 3 mm. to 25 mm. in length when expanded, and were detected one by one within 48 hours after the dredged material had been brought home, and while I was searching through it for nudibranchs. In its unexpanded state, when it is coated with a rough tawny epidermis, the species is easily passed over as a form of simple Ascidian. Once this epidermis is shed, however, and the rosy salmon-coloured column is extended and crowned by its wreath of brown-barred tentacles even the smallest

specimen arrests attention. All of the eight individuals lived with me for a fortnight, during which they underwent fantastic changes of form, passing from regular cylinders into slender-stalked cups, and thence into dome-shaped umbrellas as the orange mouth became exserted.

Gosse, in his account of the species (*British Sea Anemones*, p. 204), speaks of having seen one specimen protrude from the mouth "a bundle of what appeared to be true Acontia." Undoubted acontia were protruded by most of my Bullock specimens eight days after they had been dredged, the acontia issuing not only from the mouth but, in some instances, from ruptures in the walls of the column. Magnified 450 diameters these acontia were seen to be crowded with slender cigar-shaped cnidae or thread-cells which under the light pressure of a cover-glass freely discharged their ecthoræa or filaments.

This species has evidently a wide bathymetrical range, from 8 f. at Bullock to 200 f. off the Irish south-west coast. At Plymouth, Miss Stephens tells me, it has been dredged in from 14 to 30 f. (*Marine Journ. Biol. Assoc.* vii., 1904).

N. COLGAN.

Sandycove, Co. Dublin.

Wrens on Migration at the Tuskar Light station.

In the early hours of Tuesday morning, September 17th, 1912, *i.e.*, between 3.10 a.m. and dawn, a Wren came up to the lantern of the Tuskar Lighthouse, and was collected by Mr. Glanville, who kindly handed the specimen over to me. At 9.30 a.m. of the same morning I collected another Wren on the rock. At 7.10 a.m. on Tuesday, September 24th, 1912, I collected a Wren on the rock, and at 9.30 of the same morning I collected another specimen, also on the rock.

University, Sheffield.

C. J. PATTEN.

Grasshopper-Warblers from Tuskar Light-station.

On Tuesday morning, September 17th, 1912, at 8.20 I collected a Grasshopper-Warbler, and at 12.35 p.m., same day, I collected another. Both were obtained as they perambulated about on the rock.

University, Sheffield.

C. J. PATTEN.

The Greenland Wheatear in Ireland.

When at the Dundee meeting of the British Association, I had the pleasure of meeting Miss Rintoul and Miss Baxter, who have done such good work at bird-migration on the Isle of May, also Mr. Eagle Clarke, of Edinburgh, and they inform me that the length of wing is the only safe character whereby to distinguish the Greenland Wheatear from the ordinary form which breeds in Great Britain and Ireland, and that all specimens of *Saxicola oenanthe* with a wing measurement exceeding

100 mm. = 3.94 inches, may be considered to be the larger race—*Saxicola oenanthe leucorrhoa*. It will be seen, therefore, from my book on Bird Migration (p. 631 and 3) that several specimens of the Greenland Wheatear have been obtained in Ireland, some as far back as 1885.

Fassaroe, Bray.

RICHD. M. BARRINGTON.

Common Eider Nesting in Donegal.

In *British Birds* for September, H. W. Robinson records the finding by "a friend" of two nests of *Somateria m. mollissima* "on a small island off the coast of Co. Down," on June 2, 1912. In the October issue of the same Journal, "Co. Down" is corrected to "Co. Donegal."

BOTANY.

Saponaria Vaccaria in Dublin.

On the occasion of the visit of the Dublin Naturalists' Field Club to the newly-made ground at the North Wall in July last, I observed several plants of *Saponaria Vaccaria*. As this ground has been formed by sand and mud dredged from the bottom of the Liffey, and seems remote from gardens, it would seem probable that the plants have originated from seeds which have come with a cargo of grain. The species is native over a considerable portion of central and southern Europe. I wonder whether Miss Knowles has a record of this plant in her lists of aliens found in the vicinity of granaries. It is a pity that no competent botanist was amongst the party on the date mentioned, as there was a particularly rich cereal flora on the ground, which would have well repaid a careful study.

W. F. GUNN.

Dublin.

GEOLOGY.

The Shelly Bank, Dublin Bay.

On October 5th, 1907, the Dublin Naturalists' Field Club held an excursion to the Shelly Bank, situated at the South Bull, and at that time, though much decreased in size, a considerable area of low sand-dunes, with a fair though naturally restricted flora, remained. Wishing again to examine the "bank" I proceeded there on September 21, but was surprised to find that it is now non-existent, having been completely washed away. The only evidence of its former existence is a slight elevation of the sand over a small portion of the site. In the map accompanying "The vegetation of the district lying South of Dublin," by Pethybridge and Praeger, dated 1905, it appears as a strip about three quarter of a mile in length, and it may be worth recording its disappearance. It illustrates the changes which are gradually though constantly taking place along the County Dublin shores.

W. F. GUNN.

Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Rabbit, a Guinea Pig, and four White Rats from Mr. Felix Hughes, a Sparrow Hawk from Mrs. Mills, and an Indian Frog from Prof. Bayley Butler. Five White-faced Capuchin Monkeys, two Coypus, four Cockateels, and fourteen Waxbills have been purchased. Three Ptarmigan from Spitzbergen have been temporarily deposited in the Gardens by the Scottish Zoological Society. The work of enlarging and improving the Haughton House is now in full operation. A considerable increase in the size of the Members' room and its adjacent balcony, and the provision of lavatory accommodation will make the house far more convenient than at present, especially to members of the Society.

BELFAST NATURALISTS' FIELD CLUB.

SEPTEMBER 14. ROSSMORE CASTLE.—Travelling from Belfast by the 9.30 a.m. train the party were met by W. F. De Vismes Kane, who acted as conductor in the demesne with its many lakes, glens and woods, and in the natural rock garden. In the glen can be seen the last remnant of the old native woods, specimens of the Spindle-tree, Ash, and Oak. Some members of the aboriginal fauna still linger here likewise in spite of the presence of rhododendrons and other naturalised shrubs, the land snails *Acanthinula lamellata*—an addition to the fauna of County Monaghan—and *Pupa anglica* being taken plentifully with numerous other species like *Hyalinia alliaria*, which do not shun altogether cultivated areas. For the botanists the day proved rather disappointing, but Mr. Kane kindly pointed out the habitat of *Scirpus sylvaticus*, which grows by the stream-side below the wishing-well. Search of the greenhouses in the garden yielded an interesting series of imported species. Among the wood-lice the following five species, new to Monaghan, were taken;—*Trichoniscus roseus*, *T. Stebbingi*, *Porcellio pictus*, *P. dilatatus*, and *Metoponorthus pruinosus*; while in the palmhouse two young specimens of the slug-snail *Testacella haliotidea* were captured. The ornithologists reported having observed thirty-three species of birds during the day. They were pleased to learn of the great increase of the Tufted Duck as a nesting species in Lord Rossmore's demesne. Numbers of Siskins were seen among the fir trees, and it is possible that this bird nests in the park. About four o'clock the party made their way to Camla House, for tea, on the invitation of Mr. and Mrs. F. W. Millard. They returned by several routes to the railway station; some going along the towpath of the old disused canal, where some additional collecting was done.

NOTES ON THE DEVELOPMENT OF ACTAEONIA, SHEWING THAT A. CORRUGATA OF ALDER AND HANCOCK IS BUT AN IMMATURE STAGE OF THEIR CENIA (ACTAEONIA) COCKSII.

BY NATHANIEL COLGAN, M.R.I.A.

Examination of a large series of Actaeonias taken in tidal pools at Bullock on the shores of Dublin Bay, between the months of January and March, 1909, first led me to doubt the existence in this genus of the two species usually referred to it in works on the Britannic marine fauna. A further study of the development of Actaeonia from the egg up almost to full maturity raised these doubts to a conviction that the two species were in fact nothing more than different stages in the growth of one and the same organism. It would be presumption to set aside, save for the weightiest reasons, a deliberately expressed opinion of authorities so eminent in all that relates to the British Nudibranchiate Mollusca as are Alder and Hancock, the authors of these two species ; so it will be necessary to give here at some length the evidence which seems to me to justify the fusion of *Actaeonia corrugata* with *A. Cocksii*.

Both of these species were, for the first time, described and figured in the *Annals and Magazine of Natural History* for June, 1848, in a paper by Alder and Hancock, entitled "On a proposed new Order of Gasteropodous Mollusca." Here one of the species was assigned to the genus *Actaeonia* under the name *Actaeonia corrugata*, while the other, dedicated to its discoverer, Mr. Cocks of Falmouth, became the type of a new genus, *Cenia*, under the name *Cenia Cocksii*, *Cenia* being suggested to the founders of the genus by the ancient name of Falmouth, where the animal was first discovered. Subsequently, in Vol. V. of Jeffreys' *British Conchology*, published in 1869, Alder, the surviving author of the genus *Cenia*, fused it with *Actaeonia*, *Cenia Cocksii* thus becoming *Actaeonia Cocksii*.

Comparison of the descriptions and figures of the two species of *Actaeonia* shows that the distinctive specific

character relied on is the form of the head-appendages. These are described by Alder in vol. v. of Jeffreys as "short, flat, whitish tentacular processes" in *A. corrugata*, as "linear and cylindrical tentacles of moderate length," in *A. Cocksii*. Minor distinctions as to colour and size are mentioned, 0·12 inch being given as the length of the first and 0·2 inch of the second species. The body of *A. corrugata*, moreover, is said to be regularly wrinkled in a longitudinal direction, while in *A. Cocksii* it is given as smooth. In the plates, however, these wrinkleings or corrugations are shown as very inconspicuous and apparently no more marked in one species than in the other. They occurred on the lateral regions of all of the specimens of *Actaeonia* I have examined, but in none were they a prominent feature.

Between the 23rd January and the 17th March, 1909, I collected a total of 67 living *Actaeonias* in pools at Bullock, a little below high-water mark. While the form of the head-appendages in a majority of these specimens was such as to justify their reference to *A. corrugata*, in the remainder these appendages varied so considerably as to make it doubtful whether a given specimen should be assigned to *A. corrugata* or *A. Cocksii*. The smaller individuals, referred to *A. corrugata* by reason of their blunt and slightly prominent appendages, approached closely in general aspect to *Limapontia nigra*, which occurs in association with *Actaeonia* at Bullock and elsewhere on the Irish coasts; but the marked difference in the egg-masses furnished a decisive distinction. Both *Limapontia* and *Actaeonia* were kept in captivity at the same time, and both deposited eggs freely. Those of *Limapontia* were small and numerous, at least 100 in each oblong cluster, the yolk being clear yellow in a pellucid medium; those of *Actaeonia* were fully six times as large and few in number, from 2 to 30 in a cluster, an average of 13 eggs being given by 23 clusters laid in captivity. The yolk of the *Actaeonia* egg, moreover, was bright orange in a milky albumen which rendered the clusters, small as they were (usually 2 mm. long) quite conspicuous on the green *Cladophora* twigs to which they adhered. No lengthened attention

was given to the variations in the head-appendages on this occasion, as my efforts were directed chiefly to hatching out the *Actaeonia* eggs. These efforts were not successful. Although development proceeded up to the point where the eyes appeared in the embryos,¹ none of these succeeded in breaking free from the egg.

In the next year, 1910, further specimens of *Actaeonia* were taken in West Ireland on the shores of Clare Island. A close study of these, in a captivity which lasted from the 20th July to the following 3rd November, showed that the blunt head-appendages, which at the time of the taking of the specimens in July, fully justified their assignment to *A. corrugata*, had so developed in a space of two months as to equally justify their assignment to *A. Cocksii*. These specimens laid three egg-masses with from 3 to 12 eggs each, but though development proceeded quite as far with these as with the similar egg-masses laid by the Bullock specimens in the preceding year, in no case did the embryos emerge from the egg.

In recording the observations made on these Clare Island specimens, it was hinted that *A. corrugata* might be nothing more than immature *A. Cocksii*.² These observations were in part suggested by the doubts as to the distinctness of the two species to which Sir Charles Eliot had given expression earlier in the same year in his valuable *Supplement to Alder and Hancock's Monograph of the British Nudibranchiate Mollusca*.³ In this Supplement, however, the species were not fused, as the writer, having regard to the peculiar development of *Cenia Cocksii*, demonstrated by Pelseneer some twelve years previously,⁴ and to the fact that the development of the dubious *A. corrugata* was quite unknown, thought it best to retain provisionally the two species, and even to restore the genus *Cenia*, which

¹ The word "embryo" here and throughout these Notes is applied to all the stages of development of *Actaeonia* within the egg, since no true larval metamorphosis takes place at any period.

² *Proc. R.I. Acad.*, xxxi., Clare Island Survey, pt. 22. 1911.

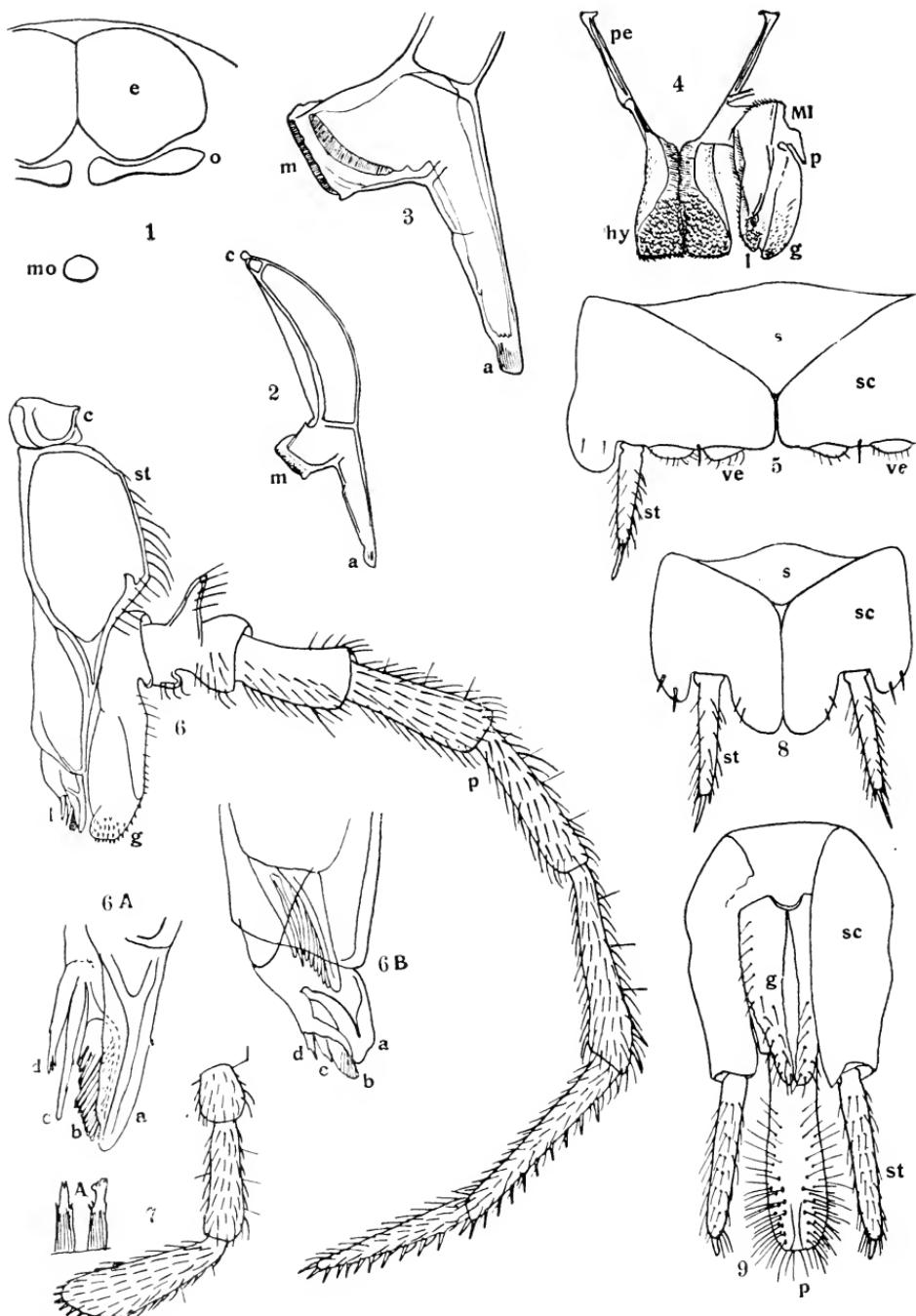
³ *Ray Society*, 1910.

⁴ La condensation embryogenique chez un Nudibranche. *Travaux de la Station Zoologique de Wimeroux*, vii., pp. 513—520.

Alder had combined with *Actaeonia* in 1869. The development of *Actaeonia (Cenia) Cocksii* appears to be unique amongst opisthobranchs, since the species undergoes no larval metamorphosis, the veliger stage being suppressed, so that the animal leaves the egg in a form differing from the adult in little more than size and the absence of tentacles (see Pelseneer, *loc. cit.*).

Observations on *Actaeonia* were continued at the opening of the present year with material from Bullock. Four specimens were taken there on the 30th January. Two of these were 6 mm. in length, the others about half that size, the head-appendages being distinct but blunt and short in the smaller specimens, long and tentacular in the larger. After little more than three weeks the head-appendages in the smaller specimens had grown so far as to be indistinguishable from those of the larger. These four individuals produced two egg-clusters. One, of only 2 eggs, the smallest number I have seen laid by *Actaeonia*, was deposited in the dish with the larger pair of specimens on the 25th February, the second of 18 eggs was laid on the 5th March in the dish with the originally smaller pair. None of these eggs fully hatched out, though in the larger cluster, development proceeded so far as to show the eye-spots and traces of pigmentation in the embryos.

On the 3rd March last, while examining some tufts of *Cladophora* taken in half-tide pools at Bullock the day before, I found adhering to a spray an egg-cluster of *Actaeonia* with 12 eggs, which, judging by their state of development, had been deposited about a week earlier, since the embryos were already revolving within the egg-case. This cluster of eggs hatched out successfully on the 19th March, and the young *Actaeonias* lived and thrived in captivity up to the following 10th May, or for fully seven weeks. I was thus enabled to study the development not only within the egg, but almost up to the adult stage. Little need be said here of the early development or embryology of these *Actaeonias*. It followed closely the various stages so lucidly described and figured in the paper already referred to of Dr. Pelseneer, to whose kindness I am indebted for a copy of the reprint. As Dr. Pelseneer's observations



PETROBIUS BREVISTYLIS Carpenter.

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appear to have ceased with the issue of the embryo from the egg, I give here some details of the subsequent development of the young *Actaeonia* in the belief that they may add something to our knowledge of the subject.

It should be premised here that the egg-cluster of *Actaeonia* consists of three envelopes. Outside of all is a rather amorphous gelatinous mass, next comes an elastic translucent membrane closely embracing the eggs, and, finally, within this, the individual egg-cases or shells enclosing the orange-coloured yolk suspended in a milky albumen. As development proceeds—usually within 6 days after deposition of the cluster—this albumen becomes absorbed so as to leave the extra-embryoni cregion of the egg quite clear. In the egg-cluster just referred to, hatched out on the 19th March, the embryos, with the eyes and mouth well developed and dark brown pigment scattered over the yellowish background of the body, were found to have emerged from their individual shells 4 days before they succeeded in forcing their way through the tenacious general envelopes. Their strivings after freedom were interesting to watch, as the young animals crawled over each other with serpentine flexibility. Now and then one of the larger individuals, for they varied a good deal in size, would thrust against the viscous envelope until his head and shoulders were protruded. But the effort was not sustained ; and the head would retire. From time to time a combined attack would be made on the prison walls, the efforts of the leader being supported by a thrust from behind by three or four of his fellow-captives, until the membrane was seen to bag outwards in a way that threatened complete rupture. The first of the infant *Actaeonias* left its individual shell at 10 p.m., on the 15th March, and all were out on the following morning ; but it was not until 6.30 p.m. on the 19th, that the first broke free from the general envelopes, whence the last issued on the morning of the 20th.

No sooner had the young *Actaeonias* gained their freedom than they showed all the precocity of the freshly-hatched chick of the barn-door fowl. A few minutes after emergence several were seen to crawl on to some sprays of the green

sea-weed *Cladophora rupestris* which floated in the dish and begin to feed on it earnestly, their mouths closely adpressed to the twigs as they stripped off the succulent surface-layer. Others, within half an hour of their emergence, were seen to float, foot upward, on the water-surface, and one to hang suspended from it by a slime-thread. In fact, the infant Actaeonias showed all the *savoir faire* of the experienced adult.

The largest of the twelve, measured as soon as it had emerged and begun to crawl, was found to be almost 1 mm. in length, the smallest was little more than half that size. In colour, all of them were pale translucent amber, flecked with brown pigment, the eyes were very distinct and placed far back from the front of the head, and the whole body-surface was coarsely tubercular or warty. Under strong illumination the action of feeding could be followed with ease. The characteristic ascoglossan radula, forming two unequal sides of a triangle with the apex pointing forwards, was visible through the transparent muzzle or snout in front of the eyes and was seen to work to and fro, as the mouth, laying hold of the *Cladophora*, made a series of rapid invaginations or gulps. Now and then a minute fragment of the green sea-weed was torn off and this fragment could be seen travelling down the oesophagus and on to the hepatic region. So ravenously did the young Actaeonias feed that within an hour of their emergence, their bodies, at first light amber in colour, became so vivid a green as to render it hard to distinguish the animals from the sea-weed. When thus gorged with food the hepatic branches appeared as coarsely granular, the green matter not being evenly distributed along them, but disposed in separate bead-like masses. In the intervals of feeding, the animals changed colour from green to yellow, as the food became digested or was discharged.

By the 31st March the opaque white spots, which in the adult form a lateral interrupted line along each side of the body-surface above the hepatic trunks, began to appear. By the 21st April some of the young animals had grown to a length of 2 mm., and showed very distinct though blunt head-appendages. By the 30th April, one had grown to a length of 3 mm., and the yellow masses of

ova became visible through the translucent foot as the animal floated on the water-surface. By the 5th May, the largest individual had grown to a length of 4 mm.; the pellucid visceral hump had become prominent, and through it the valvular action of the heart could be watched, while the head-appendages had assumed the tentacular form characteristic of *A. Cocksii*. The last of the young *Actaeonias* died on the 11th May, 1912. Originally twelve in number when hatched out on the 20th March, they had by the 1st May diminished to four, partly by death, but chiefly by loss in transferring from stale to fresh water.

As an instance of the vitality of the species it may be mentioned that the severed head of an individual just one month old, accidentally decapitated on the 17th April in the endeavour to detach it from the *Cladophora* to which it clung, lived for 7 days and a half. At gradually lengthening intervals throughout this period the lips, without any outer stimulus, continued to make automatic motions as if in the act of feeding, while the head travelled through the water by the action of its epidermal cilia. When quiescent, the least stimulus, even the jarring of the dish in which the head floated, was sufficient to set up these mnemonic actions of the mouth, reminiscent of its habitual motions while yet attached to the body.

Accepting as proved the identity of *Actaeonia corrugata* with *A. Cocksii* the name to be borne by the species remains to be considered. The generic name presents no difficulty, since *Actaeonia* has clearly priority over *Cenia*. It is otherwise, however, with the specific component, as both of the species here combined were simultaneously published (in the June number of the *Annals and Magazine of Natural History* for 1848). Under the Nomenclature Rules and Recommendations it would appear to be open to the reviser in such a case as this to adopt whichever name he may think fit. I accordingly fix on *Actaeonia Cocksii*¹, and for this reason, chiefly, that the original description and figure of *Actaeonia (Cenia) Cocksii* were taken from a mature individual.

Sandycove, Co. Dublin.

¹ In accordance with the Rules I drop here the redundant "i" in the latinized form of the discoverer's name.

THE DARTFORD WARBLER IN IRELAND.

BY R. M. BARRINGTON, M.A., F.L.S.

Although birds of greater rarity have been obtained at Irish light-stations, such, for example, as the Antarctic Sheathbill (*Chionis alba*) of the southern ocean, and Pallas' Grasshopper Warbler (*Locustella certhiola*) from E. Asia, probably no more interesting bird has occurred than the Dartford Warbler (*Sylvia undata dartfordiensis*), which was caught at the Tuskar lighthouse, Co. Wexford, by Mr. A. O'Leary, lightkeeper, on the 27th of October last, and forwarded to me as an unknown bird, in the flesh. In the ordinary sense, this bird is a resident species in S. England, and in the more extended sense of the word "migratory" it is not even an occasional wanderer across the sea, for, though it has twice occurred in Heligoland, it has never been obtained at any light-station in Great Britain or Ireland. It is the "Furze-wren" of southern England, concealing itself so easily that it is said a small patch of furze may contain several without the birds attracting attention.

The specimen received was an adult, in rather bad condition; however, with care, a very good skin was made. Mr. W. P. Pycraft, of the British Museum, kindly dissected the body, and it proved to be a female.

Two European races have been distinguished by Dr. Harttert,¹ *Sylvia undata undata*, inhabiting the south of France, Spain, Portugal, Corsica, Sardinia, and South Italy; and *Sylvia undata dartfordensis*, to which the Irish specimen belongs, being resident in the South of England and Northwestern France. This latter is slightly smaller, and browner on the back and flanks than the more southern variety.

In Newton's edition of Yarrell, 1871-74, the bird is said to remain in England throughout the whole year and never to fly more than fifty yards at a time. Howard Saunders, in his "Handbook," 1899, says that "allowing for a little wandering, it is a resident species in the South of England," and in the most recent "Hand List of British Birds," 1912, it is given as "resident." In Rodd's "Birds of Cornwall," 1880, it is said to have been formerly rare in that county, but is "now known not to be uncommon on furzy

¹ "Vögeln der Pal. Fauna," page 600.

ground in the Land's End district." Murray Matthew, on the other hand, in his "Birds of Devon," 1892, stated there had been no recorded occurrence in the county since 1877. Saunders, again, in 1899, alleges that it is apparently extending its range west and north of late years.

Whatever its present status may be, this solitary occurrence in Ireland, though very interesting and totally unexpected, is not, I think, evidence of any special movement. It may be due to a very strong south-easterly gale, which swept across the mouth of the Channel on October 26th and 27th, blowing direct from south-west England to south-east Ireland. Although its appearance may have been accidental, it is conceivable, but improbable in the case of an autumn immigrant, that, if accompanied by a male specimen, a colony might have been established in county Wexford, where Furze is more prevalent than in any other Irish—or probably English—county.

The following is a complete list, in order of date, of the birds, not recorded from Ireland previous to 1887, which have since been sent to me from light-stations. These are exclusive of racial forms of Wheatear, Willow-wren, etc.

1887	Redbreasted Flycatcher	..	<i>Muscicapa parva</i>
1887	Lapland Bunting	..	<i>Calcarius lapponicus</i>
1889	Greenland Redpoll	..	<i>Linota rostrata</i>
1890	Yellow-browed Warbler	..	<i>Phylloscopus superciliosus</i>
1890	Lesser Whitethroat	..	<i>Sylvia curruca</i>
1890	Short-toed Lark	..	<i>Alauda brachydactyla</i>
1892	Antarctic Sheathbill	..	<i>Chionis alba</i>
1893	Woodchat Shrike	..	<i>Lanius pomeranus</i>
1903	Aquatic Warbler	..	<i>Acrocephalus aquaticus</i>
1905	Melodious Warbler	..	<i>Hypolais polyglotta</i>
1905	American Snow-bird	..	<i>Junco hyemalis</i>
1907	Reed-Warbler	..	<i>Acrocephalus streperus</i>
1908	Pallas' Grasshopper-Warbler	..	<i>Locustella certhiola</i>
1908	Little Bunting	..	<i>Emberiza pusilla</i>
1910	Shore Lark	..	<i>Otocorvus alpestris</i>
1912	Dartford Warbler ²	..	<i>Sylvia undata</i>

Prof. C. J. Patten has obtained the Tree-Pipit at the Tuskar this year.¹

¹ See C. J. Patten, *supra*, p. 209.

² Since I wrote this article, Professor Patten, of Sheffield, has—without ever having seen the bird, and without ascertaining its age, sex, racial form, or destination—written to *Nature* and to the Dublin daily Press announcing its occurrence on the authority of the light-keeper to whom its name was communicated by me. This explanation is given lest it might be supposed that there were two specimens.

THE WEIGHT OF IRISH HARES.

BY G. E. H. BARRETT-HAMILTON, M.A., F.Z.S.

In preparing the article on the Irish Hare for my work on British Mammals, I brought together a number of details on weight from my note-book, in order to summarize them in my book. It may be well to publish the details as they may be of use to some subsequent investigator. The weights are only given to the nearest quarter of a pound.

Date	Sex	lbs.	Total Average. Mean.			
			Males	lbs.	lbs.	lbs.
18th Jan., 1888	9	8, 7, 7, 7, 7, 7, 6, 6, 6,	61	6·75	7	
19th Jan., 1888	4	7, 6·5, 6, 6.	26	6·5	6*	
26th-27th Oct. 1889	9	7, 7·5, 7·5, 7·25, 7·25 6·75, 6·5, 6·5, 5·5, 5	60	6·6	6·75	
	6	7·75, 7·5, 7·5, 6·75, 6·25, 6·25.	42	7	7	
Jan., 1890	2	Heaviest of a lot 7·5, 7·5.	-	-	-	
19th Oct., 1909	16	8, 7·5, 7, 7, 7*, 7*, 7*, 7*, 7*, 6·5, 6·5, 6·5 6·5, 6·5, 6·5, 6.	109·5	7*	7*	
Total,	44			298·5	6·8*	-
Date	Sex	lbs.	Total Average. Mean.			
Females			lbs.	lbs.	lbs.	
18th Jan., 1888	10	8·5, 8, 8, 7·5, 7, 7, 6, 6, 5, 5.	68	6·8	7	
19th Jan., 1888	7	8, 7, 6·5, 6·5, 6, 6, 5.	45	6·4	6·5	
22nd Jan. 1890	13	9·25, 9, 7·5, 7·5, 7·5, 7, 7, 7, 6·5, 6·5, 6·5, 4·5.	87·25	6·7	7	
19th Oct., 1909	23	8, 8, 8*, 8*, 7, 7, 7, 7*, 7*, 7, 6·5, 6·5, 6·5, 6·5, 6·5, 6, 6 6, 5·5, 5·5, 5·5, 5·5, 5.	151	6·6*	6·5	
Total,	53			351·25	6·6	-
12th Apr. 1910	1 female	(Very fine, whitish) nearly 9.	-	-	-	
22nd Feb. 1899	6 both sexes	8, 7·75, 7·5, 6·5, 6, 6 (Specially selected as the largest amongst a number). 44 males 53 females 6 of both sexes	42	7*	7	
Total,	103			691·75	6·8	-

* = Nearly.

NOTES ON IRISH PLANTS.

BY G. CLARIDGE DRUCE, M.A., F.L.S.

Last year, as a member of the excursion of international phyto-geographers, which was arranged so excellently by Mr. A. G. Tansley, I visited the counties of Galway and Clare, as well as having a short time at Dublin, Mallow, and a delightful day at Killarney, finishing at Queenstown with inspecting the magnificent gardens of Mr. Beamish prior to sailing for Plymouth. During this journey we had the advantage of the guidance of Mr. Praeger. This year I motored from Dublin to Enniskillen by way of Navan, Kells, Virginia, and Cavan, and thence by Omagh and Newtown Stewart to Londonderry. We then went over Formoyle Hill to Coleraine, thence to Portrush and along the splendid north coast by the Giant's Causeway, Ballycastle, Whitepark Bay, Cushendall, Glenariff, and Glenarm to Larne. Unfortunately I was seriously handicapped, as a long attack of phlebitis had lamed me, so that my walks were of the shortest. Still some interesting plants were collected, which are included in the following notes, which also contain some records from previous visits to Ireland.

The initials I.P.E. refer to plants seen on last year's excursion; a number of others collected on that occasion are included in my paper in the *New Phytologist* for 1911.

An asterisk is added to those plants which have not previously been found in Ireland, though a few of them have been recently published from these stations.

The numerals before the species name are those for the same species in my British Plant List.

Ranunculus acris var. **Boreaeanus** (Jord.).—Roundstone, Galway (I.P.E.); near Portrush, Co. Antrim.

106. **Fumaria purpurea** Pugs.—Larne, Co. Antrim.

109. **F. Bastardii** Boreau.—Roundstone, 1906.

112. **F. densiflora** S. C.—Larne, Co. Antrim.

133. **Arabis hirsuta** Br. var. **glabrata** (Wahl.).—Aughieglenna Mtn., Co. Clare, 1,000 feet (P. B. O'Kelly, as *A. lucida*). This plant retains its glabrous character in cultivation.

185. **Sisymbrium orientale** L.—Alien. Larne Harbour, 1912.

294. **Viola Riviniana** Reichb.—A luxuriant cleistogamous plant which I gathered (I.P.E.) at Killarney and submitted to Mrs. Gregory was at first thought by her to be var. *villosa* N.W. and M. When it was gathered Professor Graebner and Dr. Rübel both thought it was **V. pseudomirabilis* Coste, and as such Dr. Rübel has published it in his interesting paper on the vegetation of Killarney (see *New Phytologist*, 1912). Mrs. Gregory is now including it in her new Monograph of the British Violets as a variety, I believe, of the above species. Becker, in his Monograph, treats it as a hybrid of *V. mirabilis*, a species hitherto not detected in Britain. Professor Graebner was also inclined to think plants gathered on Ben Lawers in Perthshire also came under *pseudomirabilis*, but with this Mrs. Gregory does not agree.

*Var. *diversa* Gregory.—Near Omagh, Co. Tyrone.

*301 (2). ***V. epipsila*** Ledeb.—I gathered this at Killarney (I.P.E.) and recorded it in the "New Phyt." 309, 1911, as new to Ireland. Under the name *V. palustris*, with which it had been confounded, it had long previously been collected in Ireland, e.g. by H. N. Ridley in Herb. Brit. Mus. This year I also collected it in a bog near Omagh, Co. Tyrone.

304. ***V. obtusifolia*** Jord.—Near Larne, Co. Antrim.

309. **Polygala vulgaris** L. *var. *Ballii* Ostenf.—Near Ardrahan, S.E. Galway. Practically identical (except in its dark blue flowers) with the plant from the Faröes which my friend Dr. Ostenfeld distinguishes by the above name (see "Botany of the Faeröes," 71, 1901). I have also collected it on the limestone near Inchnadamph, Sutherland, and on Ben Bulben, Sligo. That mountain is the *locus classicus* for the plant which I have described as a distinct species under the name *P. Babingtonii* (Report of Bot. Exch. Club, 1911, p. 124) which is synonymous with *P. vulgaris* L. var. *grandiflora* Bab. A form of *P. vulgaris*, which may indeed be better referred to *P. oxyptera* Reichb., occurred at Clifden and Roundstone, Co. Galway; the sepals are narrower than the fruits, but they are blunter than in typical *oxyptera*, and the plants have a different habit.

370. **Cerastium vulgatum** L. *var. *longirostre* (Wich.).—To this must I think be referred plants which occur on maritime rocks near the Giant's Causeway.

Var. *hirsutum* Fries.—This also I have noticed on the Antrim coast, at Glengariff, &c.

Sagina nodosa, Fenze. *var. *moniliformis* Meyer.—North Bull, Co. Dublin; Lough Derg, Co. Clare. At 1,800 feet on the Bulben range, Co. Sligo; Gweedore, Co. Donegal.

Gypsophylla porrigens Boiss.—Alien. Galway.

421. **Montia verna** Necker (*M. chondrosperma* Ledeb.).—Near Sligo; Killarney.

*Var. *intermedia* (Beeby).—Near Cork.

421. **M. lamprosperma** Cham. (*M. fontana* L.).—Newcastle, Co. Down; Sligo.

435. **Hypericum dubium** Leers. (*H. quadrangulum* L.).—Near Formoyle, Co. Londonderry.

478. **Geranium pratense** L.—At Ballintoy and Whitepark, Co. Antrim, the flowers are of a more indigo-blue colour than those of the British plant.

G. Robertianum L. var. **Villarsianum** (Jord.).—Ballyvaughan, Co. Clare. A yellow-anthered, diffuse, prostrate and almost odourless plant with small flowers, matched very closely Jordan's type in *Herb. Cantab.* Dr. Ostenfeld, however, believes that the plant he gathered cannot be *Villarsianum* as the carpels are not rugose, but as I made three different gatherings on that day it may be he is writing of a different form which occurs there; this latter has purplish anthers, and is one of the forms of *Robertianum* which still in cultivation retains its characters, and may require a name.

497. **Erodium cicutarium** L'Hérit. var. **glandulosum** Bosch.—Newcastle, Co. Down. Portrush, Co. Antrim.

677. **Vicia sylvatica** L. *var. **condensata** Druce.—To this must I think be referred plants which I saw on the cliffs of the beautiful Whitepark Bay, Co. Antrim. Here the plants had flowers with reddish-lilac striations, of quite a different tint from the Galway plant. Near Garron Tower typical *V. sylvatica* was plentiful.

773. **R. pulcherrimus** Neum.—Virginia, Co. Cavan. New county record.

806. **Rubus Lettii** Rogers.—Virginia, Co. Cavan. New county record.

909. **Alchemilla alpestris** Schmidt.—Ballyvaughan, Co. Clare (I.P.E.). Whitepark Bay and Garron Tower, Co. Antrim.

909. **A. minor** Huds. (*A. filicaulis* var. *vestita* Buser).—Garron Tower, Co. Antrim.

914. **Agrimonia odorata** Mill.—Ardrahan, S.E. Galway.

950. **Rosa spinosissima** L. *var. **rosea**.—Ballyvaughan, Co. Clare.

942. **R. omissa** Désegl.—Whitepark Bay, Co. Antrim.

966. **Crataegus monogyna** Jacq. *var. **cuneata** Druce.—Near Virginia, Co. Cavan.

1000. **Parnassia palustris** L. *var. **condensata** Travis and Wheldon.—To this must be referred the plant from Whitepark Bay, Co. Antrim, although it is taller than the Southport plant.

*1004 (3). **Ribes americanum** Mill.—Naturalised near Cushendall, Co. Antrim.

*1015 (2). **Sedum Drucei** Graebner.—The coast form from Roundstone, Co. Galway; from Portrush and Whitepark Bay, Co. Antrim, &c., belongs to this newly described species, which appears to be the common plant of the British Isles, where Dr. Graebner did not notice true *S. acre* L.

1057. **E. palustre** L. *var. **pubescens** Coss. and Germ.—Near Omagh, Co. Tyrone.

1099 (2). **Apium Moorei** Druce (*A. inundatum* var. *Moorei* Syme).—Having collected this plant with Dr. Glück in Derbyshire, we think it should be raised to specific rank; although possessing characters so midway between *nodiflorum* and *inundatum*, yet these do not appear to be due to hybridity; nor did we see any intermediates, although both species were in the vicinity.

1104. **Carum verticillatum** L.—On Formoyle Hill near Coleraine, at about 800 feet.
1362. **Matricaria suaveolens** Buch.—Near Enniskillen, Co. Fermanagh.
1420. **Arctium nemorosum** Lej.—Leenane, Co. Mayo; near Enniskillen, Co. Fermanagh.; near Omagh, Co. Tyrone.
1430. **Cirsium britannicum** Soc. (*C. anglicum* DC.), *var. **polycephalum** Druce.—Lough Owel, Co. Westmeath (H. C. Levinge Rep. Bot. Exch. Club (as a hybrid), 1894). Near Ballyvaughan and Feenagh, Co. Clare; Formoyle Hill, with the type, Co. Londonderry.
1658. **Sonchus oleraceus** L. *var. **runcinatus** Coss. and Germ.—Larne, Co. Antrim; Enniskillen, Co. Fermanagh.
1666. **Jasione montana** L. var. **majus** Koch.—Cliffs of Brandon Mountain, Co. Kerry.
1693. **Calluna vulgaris** Hull *var. **Erikae** Aschers.—Formoyle Hill, Co. Londonderry; near Cushendall, Co. Antrim.
- *1696. **Erica Mackayi** \times **Tetralix** (*E. Praegeri* Ostenfeld in *New Phyt.*, 120, 1912, and Bot. Exch. Club Report, 1911, p. 56). Craigga More, W. Galway.
1721. **Statice linearifolium** Later.—Common. Roundstone, W. Galway; near Portrush and at Whitepark Bay, &c., Co. Antrim.
1722. **S. maritima** Mill.—The true holotrichous plant, North Bull, Co. Dublin (I.P.E.).
1765. **Gentiana campestris** L.—Garron Tower, Co. Antrim, the true plant.
1931. **Euphrasia stricta** Host.—Ballyvaughan, Co. Clare; Roundstone, W. Galway; Formoyle, Co. Londonderry; North Bull, Co. Dublin; Bushmills, Co. Antrim.
1933. **E. brevipila** Burnat and Greml.—Roundstone (Ostenfeld) and Craigga More, W. Galway; Glendalough, Co. Wicklow; Killarney.
1935. **E. eurta** Fries.—Common and variable, probably including two or three minor species. Specimens only slightly clothed with stiff hairs, Craigga More and Urrisbeg, W. Galway (Ostenfeld); North Bull, Co. Dublin; Omagh, Co. Tyrone; Formoyle, Co. Londonderry; Bushmills, Whitepark Bay, &c., Co. Antrim; Newcastle, Co. Down.
- Var. **glabrescens** Wetts.—Near Roundstone (Ostenfeld). Near Portrush, Co. Antrim; North Bull, Co. Dublin; Newcastle, Co. Down; Wicklow; Wexford.
1939. **E. gracilis** Fries.—Urrisbeg, W. Galway; Ballyvaughan, Co. Clare; Formoyle, Co. Londonderry.
- ***E. fennica** Kihlman.—New to Ireland. Clifden, W. Galway. Assented to by Professor R. von Wettstein.
1948. **Bartsia Odontites** Huds. var. **verna** (Reichb.).—Roundstone, W. Galway; Glenarm, Co. Antrim.
1954. **Rhinanthus stenophyllum** Druce.—Omagh, Co. Tyrone.
- *1955. **R. monticola** Druce.—To this must I think be referred plants I gathered on Formoyle Hill, Co. Londonderry. New to North Ireland.
1960. **Melampyrum pratense** L. var. **hians** Druce.—Glenariff, Co. Antrim. I cannot agree with Dr. Ostenfeld in calling it a form. It is I believe rather a micro-species occupying distinct areas and keeping constant in

character. Indeed the well-known student of the genus, Dr. Roniger, who has specialised on this group, considers it to be identical with the plant he has recently described as a sub-species *M. paradoxum*. Mr. Lumb has recently directed my attention to a note by Dawson Turner, who, writing of some woods near Crummock Water in Cumberland, says “When I was in this county in 1796 I remarked two very remarkable and apparently distinct varieties of *M. pratense*, one with deep yellow, the other with very pale flowers; but I have unfortunately omitted to note down the differences, and I have since lost my specimens, so I can only request the attention of other botanists to this matter.” There is no doubt that the yellow-flowered plants were my var. *hians*, which I have seen in the vicinity.

2090. **Plantago Coronopus** L.—A variety approaching to, if not identical with, var. *sabrina* Cardew and Baker occurred on maritime rocks near the Giant's Causeway.

2149. **Atriplex glabriuscula** Edmonston, var. **Babingtonii** (Woods).—Antrim coast.

2210. **Rumex Acetosella** L. *var. **angiocarpus** (Murb.).—Near Garron Tower, Co. Antrim.

*Var. **acetoselloides** (Bal.).—Near Omagh, Co. Tyrone.

2245. **Ulmus nitens** Moench. (*U. glabra* Miller, *U. procera* Salisb.).—Near Enniskillen, Co. Fermanagh; and near Dublin.

* 2246. **U. Plotii** Druce.—Between Enniskillen and Dromore, Co. Fermanagh.

* 2246. **U. major** Smith (*U. hollandica* Miller).—Enniskillen, Co. Fermanagh.

2255. **Betula alba** L. (*B. verrucosa*, Ehrh.).—Glenarm, Co. Antrim; Enniskillen, Co. Fermanagh; Virginia, Co. Cavan; near Omagh, Co. Tyrone; Coleraine, Co. Londonderry.

2256. **B. pubescens** Ehrh.—Killarney; Roundstone, W. Galway; Omagh, Co. Tyrone; Glenarm, Co. Antrim; Virginia, Co. Cavan.

*Var. **intermedia** (probably *B. alba* × *pubescens*).—Common at Killarney; near Clifden, W. Galway.

2276. **Salix lutescens** A. Kerner (*S. aurita* × *cinerea*).—Near Omagh, Co. Tyrone.

*2291. **Populus nigra** L.—Seen in Cos. Dublin, Cavan, and Fermanagh.

2293. **P. deltoides** Marsh.—Common. The more recently planted Black Poplars belong to this species. Cos. Dublin, Wexford, Wicklow, Cavan, Fermanagh, Tyrone, Londonderry, Antrim, Down, Galway, Clare, Cork, and Waterford.

*2294. **P. candicans** Ait. (*P. balsamifera*).—Planted near Cushendall, Co. Antrim.

2315. **Helleborine palustris** Schrank (*H. longifolia* R. and B.) *var. **ericetorum** (Asch. and Graebn.) Druce.—Raven's Point, Wexford.

2327. **Orchis O'Kellyi** Druce.—To this must I think be referred plants which I found near Omagh, Co. Tyrone; and near Toome Bridge, Co. Antrim.

2327. **O. maculata** L. *var. **comosus** Schur.—Killarney.

2328. **Habenaria Gymnadenia** Druce (*H. conopsea* Benth.) *var. **densiflora** (Wahl.).—Near Omagh, Co. Tyrone. A striking plant having large spikes, with closely aggregated flowers which have shorter spurs than the type. New to Ireland.

2428. **Juncus conglomeratus** L. * var. **laxus** Aschers. and Graebn.—Near Virginia, Co. Cavan.

2437. **J. bulbosus** L. var. **Kochii** Druce.—Near Omagh, Co. Tyrone, with another form.

*2442 (2). **J. ranarius** Nees.—Newcastle, Co. Down.

2485. **Potamogeton natans** L.—The plant which is so abundant in the swift stream of the Upper Range, &c., Killarney, which has been recorded as a hybrid, *P. gessnacensis* Fisch. (*P. natans* × *polygonifolius*) was considered by the foreign members of the I.P.E. to be only a barren state of *P. natans*.

2538. **Scirpus caespitosus** L. *var. **germanicus** (Palla).—Craiggaa More, Galway (Ostenfeld); near Omagh, Tyrone.

2576. **C. flava** L. var. **oedocarpa** Anders.—Virginia, Cavan.

2576. **C. lepidocarpa** × **flava** var. **oedocarpa**.—Virginia, Cavan.

2604. **C. Goodenowii** Gay var. **chlorostachya** Aschers.—Virginia, Co. Cavan; Formoyle, Co. Londonderry.

2759. **Poa pratensis** L. var. **subcaerulea** (Sm.).—Near Portrush, Co. Antrim; Newcastle, Co. Down.

2874. **Equisetum variegatum** Schleicher.—A large and probably a distinct variety grew in Glen Cahir, Co. Clare.

*2923. **Azolla filiculoides** Lam.—Near Mr. Beamish's garden, Queenstown Junction, growing in brackish water. To this rather than *A. caroliniana* Willd. belong the Cork specimens. I am indebted to Mr. Beamish for fresh specimens which prove it to be this species. It differs from *A. caroliniana* in its more robust growth and in the glochidia being without septa.

Oxford.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Mona Monkey from Mr. J. A. O'Sullivan, several Cavies from Mrs. Backhouse and from Mr. H. B. Fottrell, Sparrowhawks from Mr. J. R. Craig and Mr. E. J. McElliott, a Long-eared Owl from Mr. M. Colgan, two pairs of Weaver Birds from Miss C. S. Cree, Sulphur-crested Cockatoos from Miss Q. Angel and Mr. V. Norton, an Alexandrine Parrakeet, a Kestrel, a pair of Wood-Pigeons, and a Brambling from Mr. W. W. Despard, a pair of Bulfinches, a Goldfinch, and a pair of Grass Parrakeets from Miss Hughes-Hunter, an Alligator from Miss Fogarty, and a Green Lizard from Mr. A. Hamilton. A Ringtailed Lemur has been received on deposit; five White-faced Capuchin Monkeys, a pair of Ruffed Lemurs, and a Malabar Squirrel have been bought for the collection.

DUBLIN MICROSCOPICAL CLUB.

OCTOBER 9.—The Club met at Leinster House. J. H. WOODWORTH (President), in the Chair.

N. COLGAN exhibited dermal deposits of two Holothurians taken off the Dublin coast, *Cucumaria lactea* and *C. Hyndmanni*, both dredged in 16 fms. off Church Island, Skerries, on the 13th July last. The first species which includes *Ocnus brunneus* and *O. lacteus* of Forbes's "British Starfishes," appears to be the commonest holothurian of the Dublin coast. In three dredgings off Skerries in July last, 10 specimens of the brown form (*O. brunneus*) were taken, and 6 others were dredged in 5 fms. in Dalkey Sound in August, 1906. The white form is much rarer. It was only once taken by the exhibitor, who dredged two small specimens 8mm. in length in 8 fms. off Bullock in September last. The deposits of this species as exhibited agreed perfectly with Bell's plate in his "Catalogue of British Echinoderms," 1892; but in the case of the much rarer *C. Hyndmanni*, which has been only once previously recorded for Dublin waters, the body deposits were in general quite different from those given by Bell, although the deposits from the podia or sucker-feet were precisely as those he figures. The body deposits in the Skerries specimen, which was $2\frac{3}{4}$ inches long, formed a dense stratum in the glistening white epidermis between the five equidistant rows of crowded suckers, and were oblong ovate in form; they were solid, not flattened, and marked by numerous deep indentations, none of which amounted to true perforations. In general aspect these deposits strikingly resembled oblong potato-tubers with frequent "eyes." Canon Norman in his paper on *Cucumaria Montagui* (*Ann. and Mag. Nat. Hist.*, 1905), has shewn that the body deposits in mature *C. Hyndmanni* are thick and nodular as those exhibited and quite unlike those figured by Bell. Amongst the characteristic nodular body deposit of the Skerries specimen, an occasional flat perforated plate appeared similar to those in Bell's figure.

D. McARDLE showed a remarkable form of *Dicranella heteromalla* Schimp. which was sent to him by H. N. Dixon, F.L.S., of Northampton, and forms the subject of an interesting article in the *Journal of Botany*, October, 1912, p. 306. The moss was first found growing along the side of a trench on Burridge Heath, half a mile east of Great Bidwyn, near Hungerford, Wilts, and the range was subsequently extended for half a mile. On the slide exhibited was a perfect specimen, showing the foliage like *D. heteromalla*, but the capsules were quite unlike the normal form of that species which is common in Ireland, native specimens being shown for comparison. The capsule instead of being elongate, brown-coloured, and inclined, on a long straw-coloured seta, was short, small, deep reddish brown, almost erect, and symmetrical, wide mouthed, and on a very short red, often deep red seta, so as to be almost immersed in the tufts, and presented very much the appearance of the fruit of *Dicranella varia*. In the more erect and symmetrical capsule, the plant comes near the var. *orthocarpa* of Hedwig.

He also exhibited an aquatic form of *Eurhynchium rusciforme* Milde, which he found growing in a stream which flows through the Glen of the

Downs, Co. Wicklow, recently, with the water-moss *Fontinalis antipyretica* attached to stones. Further investigation may prove this to be the variety *inundatum* of Bridel, which has been found in North Wales and in the north of England.

W. N. ALLEN exhibited, on behalf of Mr. Alfred E. Hilton of the Quetet Microscopical Club, as a macroscopical object, a fine specimen of *Badhamia utricularis*, Berk., the plasmodium of which had been found in Highgate Wood, North London, creeping over the stump of a Hornbeam. The equally spinulose spores were shown under the microscope.

PROFESSOR G. H. CARPENTER showed a specimen of the pycnogon *Paranymphon spinosum*, Caulleary, dredged from a depth of 700 fathoms off the south-west coast of Ireland, by the Fisheries cruiser "Helga." This species is remarkable for its exceedingly long abdomen and eye-eminence, though eyes are entirely absent, and for the prominent processes on the leg-bearing outgrowths of the segments. It has hitherto been recorded only from the northern seas (Faeroe Channel; off Greenland), and from the Bay of Biscay.

BELFAST NATURALISTS' FIELD CLUB.

SEPTEMBER 21.—GEOLOGICAL SECTION.—EXCURSION TO BALLYCLARE.—On arrival at Ballyclare the members were met by James Strachan, who acted as Conductor. The area marked on the Survey map as Lower Basalt supplies interesting problems. It includes dolerite formations, two types of which were visited. The first at "Crag Hill," or "The Craigs," lies directly N.E. of Ballyclare. It is an intrusive sill of fairly coarse holocrystalline olivine-dolerite, identical in petrographical character with the dolerite of Ballygally Head, about ten miles eastward.

Sections of the Lower Basalt of Ballyeaston were then examined in Mr. Dickey's quarries; near to these quarries, the second type of dolerite, found on Mr. Gilmour's farm, was investigated. It is an intrusive boss, so finely grained that it may be called a true aphanite. A small exposure on the summit showed two marked sets of glacial striae, running respectively N. and S., and E. and W.

OCTOBER 5.—GEOLOGICAL SECTION.—EXCURSION TO BALLYMURPHY.—By kind permission of Messrs. Thomas Murphy & Son, a large party visited the Springfield Brickworks, Belfast. Robert Bell acted as Conductor. The Triassic strata underlying the Boulder-clay were first examined. They consist of banded red, grey, and greenish Keuper marks, streaked with large veins of massive gypsum. It was here that Mr. Bell, a few months ago, discovered, for the first time in this district, fine specimens of crystallized gypsum or selenite, and further good specimens were obtained on the excursion. In some of the grey layers pseudomorphs after crystals of rock-salt were obtained. Surmounting the Triassic marls, a fine exposure of Boulder-clay was examined, Ailsa Craig riebeckite rock, with other erratics, being noted. The excellent bricks made at Ballymurphy have been largely used in local buildings, and are also exported to the neighbouring provinces.

CORK NATURALISTS' FIELD CLUB.

JUNE 26.—EXCURSION TO BROWN ISLAND KITCHEN-MIDDEN.—A number of members and friends travelled by 2.50 p.m. train to Carrigtwohill. The party walked to "Murty's Cross," a distance of about three miles, and arrived at the sea-shore. Walking eastward many characteristic sea-side plants were observed, and an abundance of *Foeniculum officinale*. Time did not permit an investigation of the flora, a circumstance to be regretted, as many alien plants have become established in the neighbourhood. On arriving at Brown Island, (an island no longer, the adjacent slob-lands having been reclaimed) it was found that the pile of shells constituting the kitchen-midden was considerably smaller than when G. M. Atkinson communicated a description of it, with sketches, to the Royal Society of Antiquaries of Ireland in 1873. Much of the mound has been washed away by the sea. The part now exposed to view is nearly 100 yards in length. The heap is composed principally of oyster shells, with traces of charcoal here and there. On the return journey Barryscourt Castle was visited. Close to the Castle some gigantic specimens of Coltsfoot, *Tussilago Farfara* were noted. The projected visit to the "Big Rock Caves" near the Railway Station, was abandoned owing to lack of time. James Noonan conducted the party.

JULY 24.—EXCURSION TO ASHBOURNE.—A party numbering nearly 30 travelled to Queenstown Junction, to visit, for the first time, by kind permission of Mr. R. H. Beamish, D.L., his famous collection of plants from various parts of the world. Ashbourne was one of the few places in Ireland included in the Phyto-geographical excursion of August, 1911 (see *Irish Naturalist* for February). The collection is remarkable not only for the rarity and beauty of many of the specimens, but for the extraordinary success accompanying the open-air cultivation of warm-temperate plants. Mr. Beamish welcomed the members, and showed them over the grounds, pointing out the characteristic features of the more remarkable trees and plants. He subsequently entertained the party at tea. This excursion was one of the most pleasant and successful known in the annals of the Club.

AUGUST 28.—EXCURSION TO KILCREA ABBEY.—Despite inclement weather, a small party, led by Mr. Holland, travelled to Kilcrea station and walked along the railway line to the old Franciscan Friary usually called the "Abbey." On leaving, the members observed the few trees which remain of the magnificent avenue which once led up to the western entrance. The last Government reward for killing a wolf is said to have been paid for a wolf killed near Kilcrea.

SEPTEMBER 7.—BEEKEEPING DEMONSTRATION.—A Demonstration in Beekeeping, under the joint auspices of the Cork Beekeepers' Association and the Field Club, was given by Mr. Wm. Deely, Hon. Sec., Beekeepers' Association, in the grounds of University College, which were kindly placed at the service of the two Societies by Sir Bertram C. A. Windle, President. There was a very large attendance. Wm. H. Johnson presided at the Demonstration which included a sketch of the life-history of the Honey-bee, and was illustrated by experiments such as the driving of bees from one straw skep to another, &c.

SEPTEMBER 18.—EXCURSION TO BALLEA CASTLE.—A party of thirty, most of whom travelled by 3.30 p.m. train to Carrigaline about a mile and a half distant, assembled at Ballea Castle, the residence of Captain F. J. Hodder, who kindly entertained the party at tea. Captain Hodder pointed out some peculiar architectural features of the Castle. The grounds which are well-wooded and in part planted with rare shrubs, were then visited. The Owenbwee River is immortalised in a well-known poem by the late Denny Lane, the first Vice-President of the Field Club.

NOTES.

BOTANY.

Leucojum aestivum in North Tipperary and King's County.

While botanizing near Riverstown along the banks of the Little Brosna River, which separates North Tipperary from King's County, on the 28th of May last year, I discovered several clumps of *Leucojum aestivum* growing on each side of the river in low-lying pastures which, in winter and sometimes, as during last July, in summer, are completely under water for long periods. Though the habitat is in many respects a perfectly natural one for this species, I am not certain that it is indigenous to the locality, as it is cultivated about a mile lower down the stream in the garden of Birr Castle, and also occurs on a swampy islet in the demesne a quarter of a mile from the garden.

The seeds of this plant are dispersed by water, and it is difficult to see how they could drift for a mile up stream, and there is also the possibility that it may originally have been introduced from a wild station to the garden, still, under the circumstances, it seems safer to regard it as, though perfectly naturalized, a doubtful native in these two counties.

R. A. PHILLIPS.

Cork.

The Robertsonian Saxifrages.

Mr. Lloyd Praeger's remarks on pp. 205–6, deserve the greatest respect ; he knows this group very well, and has evidently paid special attention to it. I cannot pretend to have had anything like his experience ; my reply is, therefore, to a considerable extent, only tentative and provisional. We agree in regarding *S. Geum* as a distinct species, and in believing that natural hybrids are fairly frequent in districts where it occurs in company with *S. umbrosa* ; indeed, I am at present inclined to suspect that all the members of this group (given opportunity) cross rather freely, and that secondary hybrids, or mongrels, are not very uncommon.

It is quite true that in the north and west of Ireland *S. umbrosa* is, as a rule, remarkably constant ; but this is not the Linnean type (described as having crenate leaves), and has, I think, rightly been referred by Syme to var. *punctata*. In the Cambridge Herbarium I find excellent *S. serratifolia* Mackay from Maam, Galway (Babington, 1836), where *S. Geum* is

unknown. To my mind there is no trace of *S. Geum* in this striking plant, which is much more closely allied to *S. umbrosa*, whether one ranks it as a species, sub-species, or variety ; and it appears to me to be at least an independent entity. An authentic specimen of *S. elegans* Mackay in the Edinburgh Herbarium agrees very well with gatherings of my own from Kerry ; and I feel pretty sure that they are all *Geum* × *umbrosa* forms. *S. hirsuta* L. is, perhaps, too near *S. Geum*, as indeed Linnaeus himself remarked ; still, I am unable to see any real approach in its characters towards *S. umbrosa*, and do not believe that it is a hybrid. In south-west Ireland there is a very considerable range of variation in this group, apart from crosses ; but the extreme scarcity of typical *S. umbrosa*, *S. Geum*, and *S. hirsuta* in the whole country is surprising.

It may be of interest to add that *S. Geum* (normal, or nearly so, with crenate leaves) was found by Professor J. H. Balfour in 1838, near Clifden, Galway ; his specimens are in the Edinburgh Herbarium.

EDWARD S. MARSHALL.

West Monkton Rectory, Taunton.

ZOOLOGY.

Obisium lubricum, a False Scorpion new to the Irish fauna.

On 12th October I collected some False-Scorpions in Corry's Glen, Hillsborough, Co. Down, which were submitted to Mr. H. Wallis Kew, and I have to thank him for naming these. Among them was a specimen of *Obisium (Roncus) lubricum* (L. Koch), hitherto recorded in the British Islands only from the south and south-east of England. This specimen has been deposited in the National Museum, Dublin.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

A New Irish Moth—*Leucania Loreyi*.

County Cork is notable for the rare moths of the genus *Leucania*, which have been found there in recent years, such are *Leucania unipuncta*, *L. straminea*, and *L. vitellina*. Commander Gwatkine-Williams has now discovered *Leucania Loreyi* in the same county (*Entom. Month. Mag.* (2), xxii., p. 282). The single specimen which he found was "beaten from ivy growing on a garden wall about 30 yards from the sea in the neighbourhood of Queenstown, on the night of October 6th." This is one of the rarest British moths. Mr. Barrett mentions only one locality, near Brighton, where it was captured as long ago as 1862. ("The Lepidoptera of the British Islands," v., p. 160). On the other hand the continental range of the species is very wide, and it is common in many European localities. Through the kindness of Mr. Williams, this unique Irish specimen is now deposited in the National Museum collection.

J. N. HALBERT.

National Museum, Dublin.

Squirrels in Co. Louth.

In Mr. Pentland's notes in the *Irish Naturalist*, 1912 (p. 146), he implies that Squirrels were not known in the Co. Louth till within the last fifteen or sixteen years. My experience is that they were known there much longer ago. Between the years 1864 and 1875 I was living near Bessbrook, only a few miles distant, and often visited the Killeavy district and Ravensdale Park, and saw squirrels there. There was in those days a wood on the slope of Slieve Gullion, near Carn Lough, which has since been cut down, where the Squirrels bred and were abundant.

H. W. LETT.

Loughbrickland, Co. Down.

Late stay of Swift

Despite the coldness of August the Swifts did not depart before their usual time. About the middle of August the main body left, but several were still flying about up till the 26th. From this date till 5 September only two or three were observed here, and daily afterwards, only one was visible till 12th. With one exception, this is my latest observation of the Swift here, having noted one on 13 September in 1903. Mr. H. L. Orr informs me that he saw a small party of Swifts in Belfast up till 11 September. The latest record I can find for this bird in Ulster, is 8 October (*I. N.* xii., p. 320).

NEVIN H. FOSTER.

Hillsborough, Co. Down.

[The *Field* of 31 August, and 7 September, contains notices from the south and east of England, of the stay of Swifts through August, and in one case on 1 September. In the issue of 14 September, Mr. John Campbell records that on the evening of 9 September numbers of Swifts were flying round Lancaster, with no sign of a migratory movement among them, and that on 24–26 August he saw numbers at St. Anne's-on-Sea, on the Lancashire coast.—Eds.]

The Tree-Pipit as an Irish Bird.

I would enter a caveat against Professor Patten's suggestion (p. 212 *supra*), that the two young Tree-Pipits which he obtained at the Tuskar last September are evidence tending to prove that this species breeds in Ireland. The addition of the Tree-Pipit to our list of autumnal stragglers was to be expected, from the analogy of so many other species that are regular summer visitants to England, but whose occurrences at the Irish light-stations have been—so far as is known—exclusively autumnal. The Pied Flycatcher, Red-backed Shrike, Lesser Whitethroat, Reed Warbler, and Wryneck are five well-known instances—to which the Tree-Pipit may be added as a sixth—of summer visitants that breed regularly in England, though not in Ireland, but which have been proved to turn up at uncertain intervals at the Irish light-stations in autumn, though not in spring. I am not, of course, forgetting the solitary Pied Flycatcher obtained in Ireland in spring—so long ago as 1875—by Mr. Robert Warren,

nor the equally isolated case of the Wryneck shot in Colonel Tottenham's Co. Wicklow demesne in the spring of 1895. As against these evidently exceptional occurrences, we have Mr. Barrington's records of eight Pied Flycatchers and five Wrynecks, killed at light-stations, all in autumn, while the Lesser Whitethroat, Reed Warbler, and Red-backed Shrike, have each been sent to him twice in autumn, never in spring, and Professor Patten has himself lately added two to the list of the Reed Warbler's autumnal occurrences, making them altogether four.

This tendency to come to the lights in autumn, and not in spring, is, I need hardly say, extremely significant. It is, as the readers of Mr. Barrington's book know, quite the reverse of what happens in the case of birds actually known to visit Ireland for breeding purposes. These come to the lanterns chiefly in spring. Mr. Barrington's records, extending as they do over a long series of years, must be fairly conclusive as to the proportions in which the different species occur at the lights at both seasons. (The fact that Professor Patten has, by special effort, collected some of the scarcer species in comparatively larger numbers does not affect the question, since it is obvious that he might by similar methods collect the more common kinds in yet greater abundance, and the proportions, on which the main conclusions depend, would, doubtless, remain very much the same). And Mr. Barrington's records bring out nothing more clearly than the fact that every species of migrant, whether an autumnal or a spring visitant, comes to the lanterns in much greater numbers at its season of arrival than at its time of departure. The spring visitants, notwithstanding such obvious facts as that their numbers must have largely increased during their stay here, and that a young bird must, *ceteris paribus*, be more liable to misadventure than the adult, yield at their time of departure only a third of the number of victims they furnished on their arrival. With the winter visitants, for reasons easily guessed, the disproportion is greater still. But the fact stands out that no bird whose occurrences at the light-stations have hitherto been only autumnal can reasonably be presumed to rank among our spring visitants. We must wait till the light-stations begin to yield it in spring. For the present, analogy groups the Tree-Pipit (as an Irish bird) not merely with the Pied Flycatcher, Red-backed Shrike, Lesser Whitethroat, Reed Warbler, and Wryneck, which, like itself, breed regularly in England, but also, in a sense, with such wanderers from greater distances to our lights as the Red-breasted Flycatcher, Woodchat Shrike, Yellow-browed Warbler, Aquatic Warbler, Pallas's Grasshopper-Warbler, Barred Warbler, Rufous Warbler, Melodious Warbler, Little Bunting, and Short-toed Lark; since all these, by the cumulative evidence of their autumnal occurrences, detected in most cases by inexperienced observers, and not matched by any corresponding list of unexpected spring stragglers, yield convincing testimony to the strength of the autumnal westward-wandering habit, and make it a matter of no difficulty at all to understand why birds living so much nearer to our shores should sometimes, at the same season, take the same course.

R E V I E W.**MONSTER FISHES.**

The Teratology of Fishes. By JAMES F. GEMMILL, M.A., M.D., D.Sc. pp. xviii and 74. 4to. Plates i.—xxvi. Glasgow ; James Maclehose and Son, 1912. Price 15s. net.

"Teratology" may be defined as the study of the abnormal duplication of organs. In the higher mammals, it has supplied us with the fables of Cerberus and Cyclops. The phenomenon is by no means so rare as one would expect, and it escapes observation owing to the fact that the great majority of individuals exhibiting monstrous growths die at a very early stage in development. Figures showing the relative frequency of monsters, as estimated by various observers, vary within very wide limits. Whilst investigating abnormal development in the Salmonidae, Gemmill found that the proportion showing double monstrosity was 1 in 200-350.

In the present work the author deals chiefly with abnormal duplications of considerable magnitude, especially those occurring in the Trout and the Salmon. These fishes offer peculiarly favourable conditions, owing to the ease with which development can be followed, and the abundance of material available in hatcheries. The chief major abnormalities are (1) doubling at the anterior end ; (2) doubling at the posterior end ; (3) doubling at both ends, and (4) doubling only in the mid-region of the body. In addition to giving a detailed account of his own researches, the author briefly summarises the results and opinions of other workers.

Satisfactory explanations of the origin and causation of abnormal duplication are not yet forthcoming, but the author briefly states the conclusions to which his studies have led him. He is of the opinion that monsters may be produced either by spontaneous germinal variation, or by the direct action of the environment during development. In the former case the characters are innate, in the latter case they are acquired. If the monsters survive and reproduce, those originating from a germinal variation transmit their malformations to their offspring, whilst there is no evidence that those originating by the action of the environment do so. The malformations, whether of innate or acquired origin, tend to develop along certain lines of instability. The author does not tell us how we are to distinguish between the results arising from innate and acquired variation, and till that can be done it seems useless to say that the one is transmissible, and the other is not.

The volume is furnished with an extensive Bibliography of the subject, and illustrated with twenty-six plates of photomicrographs of specimens and sections which are, unfortunately in many cases too small to show the necessary detail.

The study of Teratology throws many interesting sidelights on the normal processes of development, and this book certainly justifies Dr. Gemmill's claim that the subject merits an important place in the biological field.

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